

**ANALYSIS OF THE EFFECT OF OIL SUBSIDY
WITHDRAWAL ON THE ECONOMIC GROWTH OF
NIGERIA**

BY

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Abertay University Dundee for the award of the Degree of
Doctor of Philosophy**



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Declaration

I Sabiu Sani Bariki hereby declare that this thesis has been written by me, that it is the record of work carried out by me and that it has not been submitted in any previous application for a higher degree.

Signature of candidate Date

Certification

I certify that this thesis is the true and accurate version as approved by the examiners, and that all relevant ordinance and regulations have been fulfilled.

Signature of Director of Study..... Date.....

Dedication

This work is dedicated

To the Glory of Allah (*Ta'alah*)

To the Honour of Prophet Muhammad (peace be on him)

To my mother Hajia Halima (Dubu) and father Alhaji Sani Bariki

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Abstract

The issue of price deregulation in the downstream oil sector of Nigeria through gradual subsidy withdrawal has generated a heated debate in the country with the government claiming that it will guarantee long term stability in product, supply and price. This will translate into economic growth and development. Others, especially the organised labour, claim that deregulation will lead to higher product prices, higher cost of production, and cut of jobs and will bring about recession in the economy. Therefore, this thesis employs Vector Auto regression Model using Variance Decomposition, Impulse Response Function and Granger Causality tests to assess the effect of price deregulation through gradual subsidy withdrawal in the downstream oil sector of Nigeria on four macroeconomic variables which are; GDP, Inflation, Unemployment and Minimum wage. The research finds evidence that changes in oil price, as a result of subsidy withdrawal, is the major source of variation in GDP, Inflation and Unemployment, while it is not found to be a significant source of variation in minimum wages. The result also reveals that there is positive impact of oil price changes on GDP and Inflation but negative impact on Unemployment and Minimum wages at the beginning of the observation period which became positive in the later stage of the observation. Finally the Granger causality test indicates unidirectional causality running from Petroleum prices to GDP and from Inflation to Petroleum prices while there is no evidence of causality on Minimum wage and Unemployment. The result of the granger causality test is an

indication that the positive effect of changes in petroleum prices on GDP is not as a result of increased economic activity but a result of increased government spending due to increased revenue available to it as a result of subsidy withdrawal. The study suggests that countries wishing to deregulate their downstream oil sectors should evolve ways that will reduce the impact of the policy on cost of production, protect jobs, control inflation and protect real wage. This will mitigate economic recession and promote growth.

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List of Abbreviations

Acronyms	Meanings
ADF	Augmented Dickey Fuller
AGO	Automotive Gas Oil (Diesel)
AIC	Akaike Information Criterion
BP	British Petroleum
Bpd	Barrel per day
CBN	Central Bank of Nigeria
CGE	Computable General Equilibrium
CPI	Consumer Price Index
CRA	Capital Replacement Approach
DD	Demand
DF	Dickey Fuller
DPK	Dual Purpose Kerosene
DPR	Department of Petroleum Resources
EFCC	Economic and Financial Crime Commission
EIA	Energy Information Agency
FDI	Foreign Direct Investment
FG	Federal Government
FGN	Federal Government of Nigeria
FPE	Final Prediction Error
GDP	Gross Domestic Product
GNP	Gross National Product
IEA	International Energy Agency
IFS	International Financial Statistics
IMF	International Monetary Fund
INF	Inflation
IRF	Impulse Response Function
JV	Joint Venture
JVCs	Joint Venture Companies
LGDP	Log of Gross Domestic Product
LMINWAG	Log of Minimum Wage
LPEP	Log of Petroleum Price
M1	Money supply
MINWAG	Minimum Wage
NACCIMA	Nigerian Chamber of Commerce, Industries, Mining and Agriculture
NCE	New Classical Economists
NLC	Nigerian Labour Congress
NNOC	Nigerian National Oil Corporation
NNPC	Nigerian National Petroleum

	Corporation
NUPENG	National Union of Petroleum and Natural Gas Workers
OECD	Organization for Economic Co-operation and Development
OPEC	Organisation of Petroleum Exporting Countries
OPL	Oil Prospecting License
PCE	Personal Consumption Expenditure
PEF	Petroleum Equalisation Fund
PENGASSAN	Petroleum and Natural Gas Senior Staff Association of Nigeria
PEP	Petroleum Price
PMS	Premium Motor Spirit
PP	Philips Perron
PPMC	Pipelines and Products Marketing Company
PPPRA	Petroleum Products Pricing and Regulatory Agency
PSF	Petroleum Support Fund
Q1	Quarter one
Q4	Quarter four
REH	Rational Expectation Hypotheses
RH	Research hypothesis
RQ	Research question
SAP	Structural Adjustment Program
SCRPPSD	Special Committee on the Review of Petroleum Products Supply and Distribution
SME	Small and Medium Scale Enterprises
SS	Supply
TETFUND	Tertiary Education Trust Fund
TUC	Trade Union Congress
UK	United Kingdom
UNEMPRTSIS	Unemployment Rate Specified in Series
US	United States
USA	United States of America
USD	United States Dollar
VAR	Vector Autoregressive Model
VDC	Forecast Error Variance Decomposition
VECM	Vector Error Correction Model
WTO	World Trade Organisation

Definition of Terms

For the purpose of this research work some terms are used and it is imperative to give the definitions of these terms within the context of this study. These are as follows:

Deregulation

In this study deregulation is used to mean how the government could be freed of subsidy payment due to its concurrent control and involvement in the business of refining, importation and distribution of and fixing prices for refined petroleum products in the Nigerian market.

Upstream Oil-Sector

This term is used to refer to exploration and production of crude oil and associated activities.

Downstream Oil-Sector

This term is used to describe activities beyond crude oil discovery and production such as refining, storage and transportation. It also includes distribution and marketing of refined products.

Barrel

One barrel of oil is equivalent to forty-two (42) U.S. gallons or one hundred and fifty-nine (159) litres.

Refinery

This is a factory that refines crude oil into petroleum products and fuels. In Nigeria, there are four (4) refineries: Port Harcourt I, Port Harcourt II, Warri and Kaduna refineries.

Pipelines

It is lines of connecting pipes often under the ground, used to transport crude oil to the four (4) refineries in Nigeria at a total distance of seven hundred and nineteen (719) km. The pipeline network, however, covers five thousand and one (5001) km in Nigeria.

Liberalization

Liberalization as it affects downstream oil-sector means opening up of the sector to competition among all players in the industry. It means ensuring that every aspect of production, refining, distribution and

dispensing of petroleum products is self-financing. Liberalization involves competitive pricing of products.

Privatization or Divestiture

It connotes a number of different processes such as leasing liquidation and the transfer of ownership and assets from public to private hands.

Commercialization

This entails reforms of public enterprises so that their operations are subject to competition and market forces. There would be no alteration in state ownership and control of the enterprises, ownership is vested on the state.

Subsidy

It is viewed here as the payment by the government or its agency, that is responsible for refining, importation and distribution of petroleum products such as Nigerian National Petroleum Corporation (NNPC) for example in Nigeria, in order to make the price paid by consumers lower than the cost of producing the subsidized petroleum products, the price is less than marginal cost and in order to have the uniform pump price throughout the country.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND TO THE STUDY

Worldwide, petroleum and energy in general are indispensable for human sustenance and industrial production. Thus, crude oil is the mainstay of the Nigerian economy, accounting for a massive 83% of total federally collected revenue in 2008, 65.8% in 2009, 73.8% in 2010 and 75.67% during the second quarter of 2014 (CBN Statistical Bulletin and Reports, 2014). In fact this has been the trend from 1972. In West Africa, Nigeria accounts for 60% of all consumers, over 50% industrial and manufacturing potential and about 47% of regional GDP (CBN 2011a). Certainly, the subject of oil subsidy withdrawal is of immense interest to each of Nigerian's over 170 million citizens.

However, the long-standing decay of the oil industry in Nigeria has largely been attributed to government ownership and control of the sector. This had actually fuelled calls for public sector reform. In Nigeria such reforms are variously referred to as commercialization, privatization or more recently, deregulation.

Consequent upon this, the federal government of Nigeria decided to embark on deregulation of the downstream sector of the oil industry. The most prominent feature of the deregulation policy however, is subsidy withdrawal. Deregulation of downstream oil-sector is aimed at reducing the role of the government as owner of assets and operator in the sector while maintaining an active role as policy maker and regulator. The policy initiative is predicated on government objective of removing

the institutional, regulatory and financial difficulties inhibiting the development of the downstream oil-sector and enhancing the sector's market orientation.

Mayer (2001) sees Nigeria's decision to withdraw subsidy at the downstream oil-sector to be in line with international trends. All over the world, from developed to developing and least developed petroleum endowed countries, deregulation of the oil-sector has emerged in the past decade as a policy imperative for governments. This is because it is widely believed that private capital and expertise within an appropriate framework that encourages delivery will expand the potential for providing services and infrastructure beyond that which the state alone can deliver.

Globally, the impetus for deregulation of downstream oil-sector has been driven by re-conceptualization of the role of the state in the economy. This has been accompanied by a paradigm shift in the approach to the provision of services and infrastructure traditionally provided by the state. Lawal and Derek (1985) asserts the view that certain types of services such as energy, telecommunications and transport infrastructure are "Natural monopolies with goods characteristics" has been replaced by the perspective that such services can be provided by the private sector if they are packaged in a particular way. Moreover, if the state creates institutions for a competitive

environment and/or regulation of these sectors, they can readily be owned and operated by the private sector.

The federal government's decision to deregulate the downstream oil-sector, despite the huge amount that has been spent on it, is undoubtedly based on the poor performance of the sector and the belief that private ownership and management of the refineries, pipelines and depots will improve the delivery of the sector. It is also, however, based on global trends over the past decade and the acceptance of "Washington Consensus" that the role of the state should be confined to creating an enabling environment for the private sector (Mayer 2001), which will act as the engine of growth in the economy.

A critical dimension of internal experience is, however, that deregulation of the downstream oil-sector is not a panacea and may not be an appropriate response to the poor performance of the sector in Nigeria. Reason adduced for this is the institutional arrangement of the stakeholders such as Nigerian National Petroleum Corporation (NNPC), Pipelines and Product Marketing Company (PPMC), Independent Marketers, Petroleum and Natural Gas Senior Staff Association of Nigeria (PENGASSAN), National Union of Petroleum and Natural Gas Workers (NUPENG) etc., within the sector, as well as structural problems associated with the market environment in which they operate. Also, the over dependence of virtually all Nigeria's economic structure on petroleum products cannot be overemphasized as part of the reasons.

As expected, public opinion about the deregulation in Nigeria covers a wide spectrum and cuts across all sides of the argument. Some Nigerians hold the view that the deregulation cannot be complete whether in the downstream oil-sector of Nigeria or indeed, in any other sector of the national economy (Oluloye 2006). Thus, it is widely believed that deregulation is desirable in freeing government of its concurrent control, and involvement in the business of refining, importation and distribution of refined petroleum products in the Nigerian market. In their own opinion, this group of people believes that, deregulation of the petroleum industry in Nigeria should be implemented in phases, so as to enable the state-owned monopolies to regain efficiency before full privatization.

Another school of thought strongly believes that the Nigerian petroleum industry must not be liberalized or deregulated or privatized completely for whatever reason. They say the status quo should remain, may be with some fine-tuning made 'here and there', to improve efficiency as appropriate in the overall national interest (Oluloye 2006). Essentially this is the implied position of the Nigerian Labour Congress (NLC).

Besides, labour unions have argued that the subsidy withdrawal at the downstream oil-sector should not be seen by the government as another means to afflict poor Nigerians with more hardship but rather to bring measures that will extend the benefits of this policy to the poor.

This is generally termed according to Mayer (2001) as universal services; an obligation of the government. Also, labour unions argued further that the statement credited to the federal government, that the amount realised from unsubsidised petroleum products domestically consumed by Nigerians will unlock resources which are supposed to be allocated to other areas such as health, road, housing and education in order to enhance the provision of these services. This has not yet been felt especially as far as health and education sectors are concerned.

An extremely worrying aspect of Nigeria's deregulation of the downstream oil-sector is the widespread perception among key stakeholders, especially the trade unions, that beneath the rhetoric of Federal Government of Nigeria (FGN) about the benefits of the deregulation and how the FGN's objectives resonate with international practice, lays a sinister set of objectives and personal agendas. These objectives, according to NLC, involve using the deregulation process to enrich the individuals who are the key decision-makers and implementers of Nigeria's privatization process. If this is not a mere perception, the process is doomed to failure.

However, stakeholders especially from the government, insist that complete deregulation including total and final dismantling, unbundling and subsequent wholesale privatization of all state-owned petroleum business, should proceed without further delay with maximum dispatch for the continued and meaningful survival of the Nigerian petroleum

industry in the 21st century. In fact, for such Nigerians, they see “The benchmarks of globalization and not nationalization as a factor that dictates the tempo of new world order in international petroleum market transactions” (Oluloye 2006 p. 2).

Thus, this research effort provides useful indication of the appropriate conditions under which deregulation of the downstream oil-sector may be successful. According to Rogers (1999) as quoted in Mayer (2001) while analyzing private participation in infrastructure provision among sectors and regions, shows that Latin America and the Caribbean accounted for 48% of all such initiatives between 1990 and 1998, East Asia and the Pacific for about 30%, Europe and central Asia for about 10%, South Asia for 8%, the Middle East and North Africa for about 3% and sub-Saharan Africa for about 2%. These statistics confirm the suggestion that deregulation of the downstream oil-sector is more likely to succeed in medium to high income countries that have better developed economic institutions than lower income countries like Nigeria.

Implementation of government subsidy withdrawal policy, as discovered in this research, has wide reaching implications for industry and Nigerian masses; it leads to product price increases and has generated industrial and social upheavals in the body polity.

As noticed by Lardic and Mingnon (2006), Jones *et al.* (2004) and Brown and Yucel (2002) among others, various means exist through which prices of petroleum products may have an impact on economic

activity. However, in this research, it is discovered that from the consumer stand point (household, industry and government), the energy bills grow, whereas from the production stand point, companies have to contend with a rise in unit costs. All in all, a rise in the energy prices causes a drop in productivity, which is passed on to (i) the minimum wages;(defined as the lowest remuneration that employers must pay by law to the workers) (ii) unemployment; (iii) Gross Domestic Product (GDP) and (iv) inflation. Therefore, this study is conducted to examine the effect of deregulation on the above major macroeconomics variables in Nigeria with a view of finding how deregulation policy affects them and the way forward.

The goal of this study therefore, is to look at the problem of deregulating downstream oil sector in Nigeria and its effect on some macroeconomic variables. Some of the problems that necessitate deregulation include: the general inefficiency in the running of the country's refineries which provides the product for local consumption. This coupled with sustained increase in the demand for the product forced the government of Nigeria to resort to massive importation of the refined products. The importation of the product leads to the problem of high cost of subsidy which the government has to bear. The cost of this subsidy stands at a whopping N115 billion for the first quarter of 2011. In May 2011 alone, about N74 billion was spent on subsidy, (Mirror 2011, Akinmutumi 2011). This poses a serious problem of sustainability where

the government is saying that the economy cannot sustain the rising cost of subsidy.

On the other hand is the effect the deregulation will have on real income (defined as nominal monetary income discounted for inflation), due to the fact that deregulation will lead to increase in petroleum prices and could lead to inflation. Therefore, nominal income may rise but real income will continue to dwindle consequent upon the inflationary pressure. Other problems are the social unrest and loss of productivity that could follow as a result of industrial action by labour unions that always characterize increases in the petroleum price in Nigeria. It could also lead to low profits due to increase in unit cost, which could also lead to low capacity utilization and eventual cuts in employment.

Therefore, this study makes an empirical analysis using an unrestricted Vector Autoregressive Model (VAR) employing Impulse response Function, Variance Decomposition and Granger Causality tests to study the effect of subsidy withdrawal at the downstream oil sector in Nigeria on some macroeconomic variables that are critical to the growth of the economy.

To achieve this, seven objectives were raised for the research.

1.2 OBJECTIVES OF THE STUDY

For the purpose of this research and in order to achieve the aim of this study, the researcher considers six objectives of which there is one main objective and five other specific objectives.

The main objective:

1. Is to look into the dynamic effects of subsidy withdrawal at the downstream oil sector on the economic growth of Nigeria which was achieved through four specific objectives.

The specific objectives are:

2. To determine the effect of subsidy withdrawal at the downstream oil sector on GDP.
3. To evaluate the effect of subsidy withdrawal at the downstream oil sector on Inflation.
4. To investigate the effect of subsidy withdrawal at the downstream oil sector on Minimum wage.
5. To analyse the effect of subsidy withdrawal at the downstream oil sector on Unemployment rate.

Another specific objective of the study is:

6. To suggest possible policy measures and actions as medium and long-term solutions to the lingering macroeconomic crisis caused by the subsidy withdrawal at the downstream oil-sector.

1.3 SIGNIFICANCE OF THE STUDY

This thesis examines the effect of subsidy withdrawal at the downstream sector of the Nigeria's oil industry and the resultant fluctuations of price on the economic growth of the country. Many studies were conducted to examine the effect of changes in the prices of oil on the economic growth of countries for example (Hamilton 1983, 2005, 2011 and 2012; Dartanto 2013; Asafu-Adjaye, 2000; Goto and McKenzie 2002; Abouleinein, El Laithy, and al-Dīn, 2009). For Nigeria, there are a considerable number of studies that were conducted to analyse the effect of oil price changes on the economic growth of the country for example, (Adenikinju, 2000; Adedipe, 2008; Aliyu, 2011; Iwayemi, and Fowowe, 2011; Asekunowo, 2012). However, these studies focused their attention on the effect of oil price changes at the international market level on the economic growth of the country. Therefore, this study contributes to the literature by examining the effect of changes in domestic oil prices on the economic growth of Nigeria. This is due to the fact that Nigeria is a net crude oil exporting country and therefore increases or decrease in the international crude price could have different effect on the economy from the increase or decrease in the domestic oil price.

The study makes further contribution by employing quarterly time series data from 1980 quarter one (q1) to 2012 quarter four (q4) to find the effect of subsidy withdrawal on the economic growth of Nigeria. The findings of this research indicate that the federal government of Nigeria's policy to deregulate the downstream oil sector has serious effect on the

economy, and these effects could be very unpleasant to the citizens. This is in the form of high rate of unemployment, rising inflation, and low industrial capacity utilization in the real sector which remain critical to the economic growth of the country.

Therefore, the study of this nature becomes very significant. Its recommendations could make the Nigerian government realize that in the short-run certain measures has to be adopted as an option to determining the petroleum products prices using the international market price for crude oil. While in the medium and long run certain measures have to be adopted to ensure sufficient supply of petroleum products without heavy burden of subsidy on government.

Another significance of this research is that; it will create awareness on the implication of withdrawing subsidy at the downstream oil sector on productivity in the economy, going by its findings that the rate of unemployment may continue to grow and this will negate government's policy of employment generation especially for the youth and women in the country.

It will help government to find solution to other effects of deregulation of downstream oil-sector on Nigerian economy as it affects some macroeconomic variables. Such effects are mostly felt on:

- Minimum Wage
- Employment
- Inflation

- G.D.P.

Lastly, the study helps to provide information to planners and future researchers.

1.4 SCOPE OF THE STUDY

The scope of this thesis is to study the effect of subsidy withdrawal at the downstream oil sector on Nigeria's economy by considering its effect on some important macroeconomic variables which are; domestic oil price, minimum wage, inflation, unemployment and GDP. The study could only limit itself to Nigeria due to resource constraints, availability of data and time factors. More so, policies are continuously being changed by governments to reflect the peculiarities of their countries. Lastly, one need to bear in mind that peculiarities exist between different countries, hence, the results of this PhD project which focuses on Nigerian economy might not be generalized for other countries.

1.5 ORGANISATION OF THE STUDY

This research work is organised into six chapters as follows:

Chapter One introduces the topic on which the research was carried out. It states the rationale of the research and the problem which the research work sets out to address. The chapter also spells the significance of this study and the scope which the study covers.

Chapter Two discusses the background literature on the Nigerian oil industry. Therefore the historical background and the dynamics of the Nigeria's oil industry were reviewed. Furthermore, the performance, contributions and problems of the sector were analysed. Finally an analytical review of the perspective of regulation and deregulation policies in the downstream sector of the industry and their mode of implementations was carried out.

Chapter Three covers literature reviews on deregulation policy, the downstream oil sector and the theoretical framework. Therefore, in this chapter analysis of macroeconomic theories and their relationship with market deregulation is carried out. The theories reviewed are the classical economic theory, the Marxist's theory, the Neoclassical economic theory, the New classical and the Keynesian theories. An analysis of some economic systems in relation to market deregulation is also carried out in this chapter. These are the free market capitalist economic system, the central planning or socialist economic system and the Mixed economy. The concept of subsidy is examined and the taxonomy of oil market deregulation is also reviewed and analysed. Furthermore, the framework for considering subsidy introduction in the downstream oil market is analysed. The theoretical link between oil market deregulation and the macroeconomic variables that were studied in this thesis was also examined.

An analytical review of the literature on oil market deregulation is also carried out in this chapter. Finally, an analysis of the deregulation of downstream oil sector in the Nigerian context is carried out in this chapter.

Chapter Four contains specification of the model used and elaboration of method and methodology adopted in the study. The chapter examines the variables used in this thesis, the data, its nature and the sources of the data. The properties of the data and tools used for the data analysis were discussed. The tools used for the diagnostic tests of the time series properties of the data are Augmented Dickey Fuller (ADF) and Philip Peron (PP); these tests were analysed. The long run relationship between the variables was also checked using Johansen cointegration test. Finally, the tool used for the data analyses in this thesis was the unrestricted Vector Autoregressive model (VAR) and the accompanying Impulse Response Function, Granger Causality test and Variance Decomposition.

Chapter Five deals with data presentation, analysis and discussion of results, in which data on trend of minimum wage, domestic petroleum prices, inflation, unemployment and GDP in Nigeria is presented, analyzed and interpreted and an implication of the findings on the economy is also discussed. The chapter investigates the dynamic causal relationship between changes in domestic prices of petroleum in Nigeria and four macroeconomic variables namely; GDP, Inflation,

Unemployment and Minimum wage. This was done using unrestricted VAR. The short run and long run effect was observed using Impulse response function, the causal effect was examined using Granger causality test, while the level of significance of the changes on each of the variables was examined using Variance decomposition test.

Chapter Six comprises of summary, conclusion, recommendations, limitations of the study and suggestions for future research.

1.6 STRUCTURE OF THE THESIS

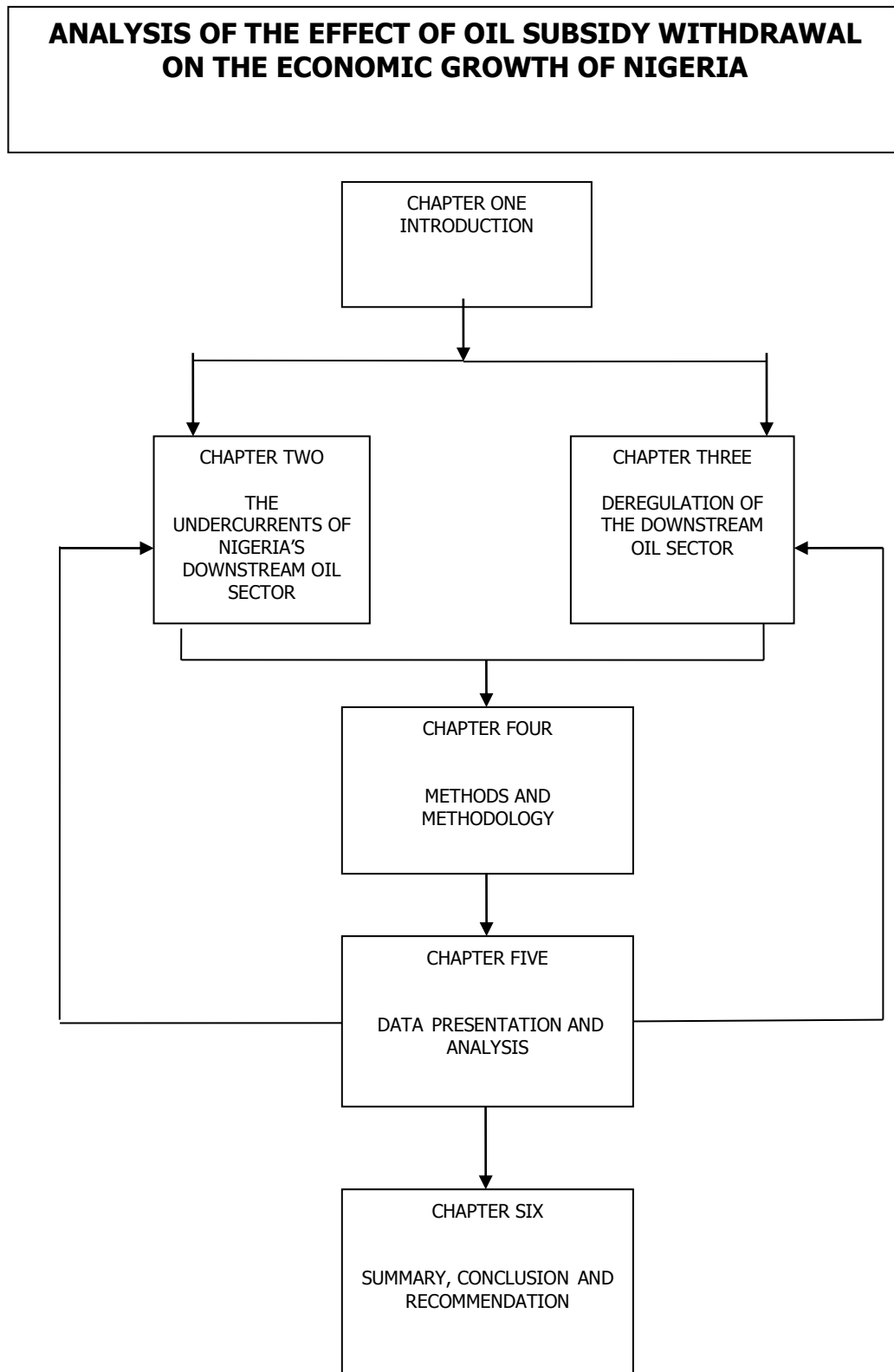


Figure 1.1 The Structure of the Thesis

CHAPTER TWO

THE UNDERCURRENTS OF NIGERIAN DOWNSTREAM OIL SECTOR

2.1 INTRODUCTION

Analyses of the effect of deregulation of downstream oil sector on the economic growth of Nigeria will make no meaning without understanding the background history and the dynamics of Nigeria's oil industry. Therefore, in this chapter an attempt has been made to provide the historical background of the oil industry and the developments and challenges it went through since the exploration activities began over a century ago. The chapter also appraises the performance, contributions and problems facing the industry. Finally an analytical review of the perspective of regulation and deregulation policies and their mode of implementation is carried out.

2.2 BACKGROUND HISTORY OF THE NIGERIAN OIL INDUSTRY

The history of Oil industry in Nigeria can be traced back to 1908 when a German Company, called Nigerian Bitumen Corporation began oil exploration activities in an area called Araromi in south-western Nigeria. However, this pioneering activity was halted by the outbreak of First World War in 1914. Oil exploration resumed in 1937, but due to the Second World War the company had to suspend its operation in 1941. The activities were resumed in 1946 by a different company called Shell D'Arcy later known as Shell BP (NNPC, 2010c).

Oil in commercial quantity was discovered in Nigeria in 1956, when the search for this commodity was resumed in 1947 after the Second

World War. According to Oremade (1986), the search was initiated by Shell Development Company of Nigeria Limited which was at that time known as 'Shell D'Arcy' and later Shell BP. At that time it was based in Warri. The company was a joint stock company financed by the Royal Dutch Shell Group of Companies and the British Petroleum Group (Ibid 1986, pg. 1). The early exploration scope was the whole of Nigeria, but later the allocated area under Oil Prospecting Licenses (OPL'S) was compacted to 40,000 square miles within the Niger Delta Basin. Akata- 1 was the first oil well to come up with oil and it was drilled in 1953. According to NNPC (2010c) oil in commercial quantity was discovered in 1956 at Oloibiri, Bayelsa State of Nigeria after several years of exploration and an investment of over Thirty Billion Naira.

The country became one of the oil producing countries of the world in 1958 when it began producing up to 5100 barrels per day (bpd) from its first oil field. After independence in 1960 and the immediate years that followed, there was considerable development in granting exploration rights to other foreign oil companies in the onshore areas of Niger Delta and offshore areas adjoining the region (ibid).

Oluloye (2006) opined that in 1970s there was global up surge in crude oil prices and Nigeria made tremendous wealth from its oil production. The country also joined the Organization of Petroleum Exporting Countries (OPEC) in 1971 and established Nigerian National Petroleum Company (NNPC) in 1977; a state owned and controlled

company which is a major player in both the upstream and downstream oil sectors.

In its publication of the History of the Nigerian Oil Industry it captioned 'Development of Nigeria's Oil Industry' NNPC (2010c) which explained how Nigeria made rapid progress in its crude oil production in which the country was able to reach a production level of over two million barrels per day within two decades of the discovery of oil. NNPC (ibid) shows that from an initial production of 5100 barrels per day in 1958 production increases progressively to 2 million barrels per day in 1972 and 2.4 million barrels per day in 1979. Although production figures dropped in the eighties due to economic slump, 2004 saw a total rejuvenation of oil production to a record level of 2.5 million barrels per day. Gradually petroleum production and export became predominant economic activity in the country accounting for about 90% of the country's gross earnings. This dominant role has pushed agriculture, the hitherto traditional mainstay of the economy, from the early fifties and sixties, to the background (ibid).

While the discovery of oil in the former eastern region and former mid-western region which is now called South-South region or Niger-Delta region pleased hopeful Nigerians, giving them an early indication soon after independence that economic development was within reach, at the same time it signaled what Oremade (1986) called "a danger of grave consequence". According to him, oil revenues fueled already existing ethnic and political tension and nearly "burned" the country. This tension

reached its peak with the civil war that lasted from 1967 to 1970 (Oremade 1986).

Nigeria survived the war, and was able to recover mainly because of the huge revenues from oil in the 1970s. For some three years an oil boom followed, and the country was awash with money. Indeed, according to Adedipe (2008) there was money for virtually all the items in Nigeria's developmental plan. The literature of the postwar years shifted to the analysis of the world oil boom and bust, collectively known as the 'oil shock'. Starting in 1973 the world experienced an oil shock that rippled through Nigeria until the mid-1980s. This oil shock was initially positive for the country, but with mismanagement and military rule, it became an economic disaster. The larger middle class produced by the oil boom of the 1970s gradually became disenchanted in the 1980s, and rebellious in the 1990s and dangerous in the present years manifesting themselves as militants under the guise of ethnicity or religion who carry weapons and kill innocent people. The enormous impact of the oil shock could not escape scholarly attention. For over forty years (1970s - 2010s), the virtual obsession was to analyze the consequences of oil on Nigeria, using different models and theories (Adedipe 2008).

2.3 PERFORMANCE OF THE OIL INDUSTRY IN NIGERIA

The Nigerian National Petroleum Corporation (NNPC) has categorized the Nigerian oil sector into three main sub-sectors, namely, upstream, mid-stream and downstream.

The upstream sector according to NNPC (2012) is where the exploration, crude oil production and gas production takes place. In Nigeria crude oil drilling and production takes place at both onshore and offshore. Onshore production is where drilling and production of crude oil and gas is done on the land, while an offshore production is the situation where drilling and production of crude oil and gas is carried out in the sea or ocean.

The mid-stream according to NNPC (ibid) deals with the gas and power, renewable energy, engineering and technology, Nigerian gas master plan and Greenfield refineries initiative.

The downstream sector deals with the product distribution and retail services. Downstream sector is the link to the final consumer (NNPC, 2010d).

According to Ojoku (1992) the most problematic among the sectors over the years has been the downstream sector, which is the distribution arm and connection with final consumers of refined petroleum products in the domestic economy. The incessant crisis in supply of products culminated in the decision by the Government in 2002 to deregulate the downstream sub-sector. However, the manner of its

implementation has been controversial because, according to Ojoku (ibid), it ignores the economic realities in Nigeria.

At the upstream sector oil production by the joint venture (JV) companies account for about 95 % of Nigeria's crude oil production. Between 2001 to 2010 Shell, which operates the largest joint venture in Nigeria, with 55% government interest, through the Nigerian National Petroleum Corporation (NNPC), produces about 32% on the average of Nigeria's total crude oil production. Exxon Mobil, Chevron Texaco, ENI/Agip and TotalfinaElf operate the other JV's, in which the NNPC has 60% stake (Adamu 2010). Odularu (2008) opinioned that the over-dependence on oil has created vulnerability to the impulses of the international market, which show how critical oil is on Nigeria's major macro-economic indices. In particular, the place of oil in the mind of the average Nigerian has become more profound since the deregulation of the downstream segment of the Nigerian oil industry began in 2002. The contradiction was more glaring in 2012 and 2013, with the rise in crude oil prices at the global markets, which meant more external earnings for Nigeria, but also increased the expense burden on imported refined petroleum products! It is such contradictions that make the Nigerian economy appear strange at times, as policies seem to ignore what appears obvious to do. As such, policies designed to address the deficiencies and defects in the structure end up being poorly articulated and/or implemented because of regional, political or rent-seeking selfish interests (Business Day 2012).

Obviously, it is the same rent-seekers that continually sabotage the reinvigoration of the domestic refineries, making Nigeria to depend on importation of refined products to meet the domestic needs (Business Day 2012).

At present, Nigeria has four refineries, with a combined installed refining capacity of 445,000 barrels per day (bpd). These four refineries according to NNPC (2010e) are as below:

- 1.** The first Port Harcourt Refinery was commissioned in 1965 with an installed capacity of 35,000 barrel per day (bpd) and later expanded to 60,000 bpd.

- 2.** The Warri Refinery was commissioned in 1978 with an installed refining capacity 100,000 bpd, and upgraded to 125,000 bpd in 1986.

- 3.** The Kaduna Refinery was commissioned in 1980 with an installed refining capacity of 100,000 bpd, and upgraded to 110,000 bpd in 1986.

- 4.** The second Port Harcourt Refinery was commissioned in 1989 with 150,000 bpd processing capacity, and designed to fulfill the dual role of supplying the domestic market and exporting its surplus.

The combined capacities of these refineries is far below the domestic consumption of refined products, topmost of which is premium motor spirit (gasoline), whose average daily consumption as at April 2011 was estimated at 30 million liters (Muhammad, 2011). The refineries are however, operating far below their installed capacities, as they were more or less abandoned during the military era and the civilian

governments that succeeded it. Business Day (2012c) reported massive decay in the Port Harcourt refinery which is in a sorry state due to skipping of the routine and mandatory turnaround maintenance, negligence, corruption and outright sabotage that made products importation inevitable. As at April 2011 Nigeria imports 75% of refined petroleum product to meet domestic demand (Muhammad, 2011). Importation notwithstanding, in the main report of the Independent Consolidation Committee for Cushioning Measures (FGN 2005), it was reported that there have been persistent product shortages, due to smuggling and black marketeering that gave strength to the argument for deregulation of the downstream oil subsector in Nigeria.

The monetization of oil revenue has been a major factor in liquidity management in Nigeria. Measuring liquidity as the narrow and broad money definitions by the CBN, the early 1990s saw increases that were dampened by 1995 up until the civilian administration came on board in 1999. The new Government maintained disciplined fiscal operations for about one year and thereafter, the floodgates were opened. Since then, the CBN has been battling to keep liquidity in check, in order to ensure that it does not create adverse effects on the three key macroeconomic indices (i.e., interest rate, exchange rate and inflation rate). The greatest challenge is when Nigeria generates more revenue from crude oil sales than it budgeted; such excesses have always been monetized, creating market distortions and inflationary pressure (Adedipe, 2008).

The same argument goes for deficit fiscal operations in comparison to the GDP. The pattern of this ratio indicates the optimism that accompanies increase in oil revenue and makes Government to engage in frivolous spending or unnecessary projects. Deficit spending invariably makes Government resort to borrowing from the Central Bank through the instrument of Ways and Means Advances, which later convert into short term debt instruments that are quite expensive to service at market rates.

At this point, there is sufficient ground to examine how economic policy formulation has been impacted or induced by petroleum oil in Nigeria. As much as possible, major economic policies since Nigeria gained political independence would be examined vis-à-vis the state of the oil sector. This should provide adequate basis for making a few specific recommendations on how to reduce the dependency.

2.4 CONTRIBUTIONS OF THE OIL INDUSTRY TO THE NIGERIAN ECONOMY

Over the past fifty years the oil industry has made a variety of contributions to the Nigerian economy. These have included the creation of employment opportunities; contributions to government revenues, to gross domestic product and to foreign exchange reserves; and the supply of energy to industry and commerce.

2.4.1 Contributions to Government Revenues

The payment of substantial revenues to the government is perhaps the most important aspect of the contributions of the oil industry to the Nigerian economy. Available statistics has shown that from 1972 to 2010 the oil industry has always been the highest source of federally collected revenue in Nigeria. In 1972 out of the total of N 1,405.10m collected N 764.30m comes from oil industry, which represents 54.4%. In 1980 a total of N15, 233.50m was collected and oil revenue accounted for N12, 353.30m which represent 81.4% of the total receipt. In 1990 oil revenue was 73.2% in the year 2000 it was a whopping 83.5% and in 2010 it represents 73.8% of the total receipt (CBN 2010). Prior to the discovery of oil, agriculture was the main stay of the Nigeria's economy. It provides the highest percentage of the total revenue accrued to government and was the largest employer of labour. However the discovery of oil changes the trend and push agriculture to the background.

2.4.2 Create Employment Opportunities

One of the first contributions of the oil industry to the Nigerian economy was the creation of employment opportunities. From the start, Nigerians were employed in a variety of non-basic activities such as the building of roads and bridges, the clearing of drilling sites, transportation of materials and equipment, and the building of staff housing and recreational facilities. As time went on and as the industry's training

program progressed, they began to be employed in seismic and drilling operations, and in supervisory and managerial functions. However, direct oil industry employment in Nigeria is not likely to expand significantly in the future because the industry is very highly capital intensive, as is illustrated by the size of the capital-labour ratio in the industry, compared with other industries.

The very high capital-labour ratio in the oil industry means that growth in oil operations is generally reflected, not in the relative expansion of employment, but the expansion of capital investment. This will be particularly the case when, with the passage of time and increased extraction, the need arises for increased investment in costly techniques of secondary recovery (CBN, 2011b).

Notwithstanding the above however, oil industry has proven to be a catalyst for employment generation in Nigeria. This is evident in the number of employment generated in the refining sector, gas sector, petrochemical and fertilizer sectors. It also provides jobs to Nigerians at the service stations of the downstream sector (Ejoh E 2014).

Furthermore, oil industry has been a contributing factor to the development of other industries in Nigeria. Its products also serve as raw materials and inputs in other industries that generate employment in the country. This is in addition to the multiplier effect of the industry on the economy as whole (ibid).

2.4.3 Contribution to Gross Domestic Product

In general, the contribution of an industry or branch of activity to the gross domestic product during any accounting period is measured by its gross output less the cost of inputs-materials, equipment, services, etc. purchased from other industries or branches of activity and this is what is referred to as gross domestic product at factor cost, while deduction of any taxes net of subsidies paid, gives the gross domestic product at market prices. The gross output of the petroleum sector consists of the proceeds from oil exports, local sales of crude oil for local refining, and local sales of natural gas. But, because of the massive involvement of foreign operators in the Nigerian petroleum industry, not all of the industry's value added is retained in the country; at the moment a substantial proportion is sent out in the form of factor payments, profits, dividends, interest, fees, and wages and salaries paid abroad. It is therefore, more realistic to consider the industry's contribution to gross national product i.e., gross domestic product less factor payments made abroad. The industry's value added can also be obtained by adding together the various payments to the government in the form of rents, royalties, profit taxes, harbor dues, etc.; the wages and salaries of employees paid locally; and any net retained earnings (CBN, 2011b).

2.4.4 Foreign Exchange Reserves

This is an important aspect of the oil industry's contribution to the Nigerian economy, which could not have come at a more opportune

moment because the country is now embarking upon a massive program of the development of critical infrastructure and economic transformation which postulates huge imports of capital goods and specialized services involving massive expenditure of foreign exchange. In many underdeveloped countries, especially those that depend heavily on a narrow range of primary commodities, acute shortages of foreign exchange, often exacerbated by massive declines in world commodity prices, constitute a major obstacle to effective economic development. The oil industry in Nigeria now has substantial foreign exchange reserves and is in a healthy position of being able to finance the foreign exchange cost of her development program (CBN, 2011b).

2.4.5 Contribution to Energy Supply

Another contribution of the oil industry to the Nigerian economy is the provision of a cheap and/or readily available source of energy for industry and commerce, through the operations of the local refinery and the utilization of locally discovered natural gas. The Elesha Eleme refinery, near Port Harcourt, which came into operation in November 1965, had an initial capacity of 1.9 million tons per annum, and was designed to meet the country's main product requirements at that time, with the exception of bitumen, aviation gasoline, and lubricating oils. A liquefied petroleum gas plant, with a capacity of 15,000 tons per annum, was added in 1966. The refinery was damaged during the civil war but has since been rebuilt and expanded to a capacity of about 3.75 million tons per annum (NNPC, 2010a).

The availability of huge reserves of natural gas provides a good opportunity for the supply of cheap energy to industry and commerce. Already, associated natural gas is naturally produced jointly with crude oil and is being supplied by Shell-BP to the Power Holding Company of Nigeria. This is, for thermal electricity generation to the Nigerian Petroleum Refining Company for use as fuel in petroleum refining at Eleme and to a number of industrial undertakings around the centers of oil operations (Odularu, 2008).

The above brief review shows that the oil industry is making a variety of very useful contributions to the Nigerian economy, especially in the provision of revenues and foreign exchange. But when we move from the immediately apparent to the long-lasting impact, from the largely monetary contribution to the real economic impact, a completely different picture emerges which shows that, notwithstanding the massive increase in oil wealth, the industry has yet to make a significant impact on economic development and welfare in Nigeria.

2.5 PROBLEMS OF THE NIGERIAN OIL INDUSTRY

The oil sector has been plagued by various problems which undermined its optimal development over the years. In general terms, the oil sector of the Nigerian economy faced and is still facing some of the following problems:

2.5.1 Public Control and Bureaucracy

The Nigerian National Petroleum Corporation (NNPC) is controlled by the Ministry of Petroleum Resources. It lacks autonomy as a result decision taking is often bureaucratic and unnecessarily delayed. Therefore, the operation of the NNPC is characterized by inefficiency, especially in refinery operations, distribution and marketing (BusinessDay, 2012c).

2.5.2 Poor Funding of Investments

Frequent delays in the payment of cash calls to the joint venture operators have tended to discourage increase in the level of investment by the oil companies. Insufficiency of funds has also constrained adequate equipment maintenance and efficient refinery operations by the NNPC. The Federal Government's delay in the payment of cash calls for its JV operations in the upstream sub-sector as at 31st December, 2009 stand at N459,658 billion (Ribadu, 2012).

2.5.3 Communal Disturbances and Vandalism

There had been frequent communal disturbances and armed militant youth which disrupt crude oil production, as oil communities' clamor for higher stake in oil operations. There are reported cases of massive smuggling of petroleum products across the borders in quest for foreign exchange and to take undue advantage of the lower domestic prices vis-à-vis neighboring countries prices (PPPRA, 2004) and (Asekunowo, 2012).

2.5.4 Over-Exploration of Niger-Delta

The Niger-Delta has an area of 70,000 square kilometers and has 99% of the Nigeria's proven crude oil and gas reserves. The Niger-delta extends to Rivers, Edo, Delta, Imo, Abia, Akwa-Ibom, Ondo, and Anambra and Cross river states. The area is geographically in a rainforest belt with extensive swamp and mangrove and geologically it has sedimentary rocks with sand and slate that trapped oil, gas, and coal millions of years ago. Petroleum exploration began in the Niger-delta, particularly in Ondo state, as far back as 1908 but crude oil was first discovered in commercial quantity in 1956 at Oloibiri in Bayelsa state. Since the discovery of oil, over 60% of the Niger-delta has been explored, thus Nigeria faces the problem of over exploration of the area. One of the dangers is environmental damage or degradation which has become not only an economic issue but also a political and social one (NNPC, 2010b).

2.5.5 Gas Flaring

Every year, millions of Dollars are literally going up in smoke in Nigeria, as companies' burn off unwanted natural gas released during oil production. This flaring and venting produces more green-house gas emissions than any other single source in Africa south of the Sahara, and many who live in the Nigeria's oil producing communities, complains of chronic health and environmental problems. Much of the region where oil is pumped is a maze of winding mangrove creeks and waterways, the

giant gas flares, operated by AGIP-Nigeria belch out noxious flames and fumes that loom over homes and farmlands.

2.5.6 Oil Spillage

There had been frequent cases of oil spillage in the Niger-delta region where oil exploration in Nigeria takes place, it involves enormous discharge of oil into the land including farm lands and inland water where fishing and farming activities takes place. Ariweriokuma S. (2009) shows that between 1976 and 2005 a total of 8,768 cases of oil spillage were reported and this involves the spill of approximately 2,662,900 barrels of oil into the land, inland waters and the sea surrounding the environment of the Niger-delta area. This causes environmental pollution and damages to farm lands and inland waters and have serious economic and health implications on the inhabitants of the area. The economic aspect involves loss of fertile land for farmers and the death of aquatic life for fisher-men which culminate into serious poverty in the area. The health implication is that when such a staggering volume of oil is spilled in an area it will be absorbed into the ecosystem and is capable of contaminating a wide colony of aquatic life and animals. The inhabitants of the area have no option but to eat the contaminated seafood, animals and farm produce and in the process hydrocarbon substances find their ways into human bodies and as such suffer from different types of ailments.

The problem of oil spillage also leads to loss of lives; Ariweriokuma S. (ibid) reported that in 1998 an estimated 1,000 people died in a place

called Jesse near Warri in Delta state while scavenging petroleum products from a pipeline leakage.

2.5.7 Inadequate Refineries

Nigeria is the most populous country in Africa with over 170 million people. According to Muhammad (2011) and Akinmutumi (2011), the country consumes about 30 million litres of petroleum a day. However the four existing refineries can only refine about 445,000 barrels per day at full capacity. This is a far cry from the country's requirement. Added to this is the fact that the refineries operate far below their installed capacity. This is due to a number of reasons which include the skipping of the routine and mandatory turnaround maintenance, mismanagement, obsolete equipment and outright sabotage (FGN 2005). It is worthy to note that no new refinery was built in Nigeria for the past twenty five years, notwithstanding the rapid increase in population, number of vehicles and industries that depends on fuel to operate due to the almost total collapse of the electricity supply in the country.

2.5.8 Oil theft

Oil theft has been a serious problem not only to the Nigeria's oil sector but to the economy as a whole. According to a report by Chatham House London, as reported by The Economist (Anon, 2013), Nigeria lost at least 100,000 barrels of oil per day (bpd); about five per cent of Nigeria's total output in the first quarter of 2013. The report further indicates that oil theft cost Nigeria as much as \$8 billion a year. The

report shows that this figure is the cost to theft from its onshore and swamp operations alone. This figure does not include what may happen at export terminals and the larger-scale bunkering which involves siphoning oil from pipelines on land or under water and loading it onto small barges, from which it is transferred to bigger ships in the Gulf of Guinea that carry this to international refiners who may not be aware that it is stolen products.

The damage caused by the oil thieves also often forces oil companies to shut down their pipelines, which translates into a huge loss to the companies. This is because apart from the cost of damaged pipelines which the companies have to bear, they still have to pay the government 100% of what they owe the government (i.e. volumes produced inclusive of theft). Eventually the scale of the theft reaches a level where the companies are loss making and then decide they are better off shutting down rather than producing. As a result, Nigeria as at 2013 was producing oil at 400,000 bpd below its capacity of 2.5m bpd.

2.6 FUEL SUBSIDY IN NIGERIA

Oluloye (2006) in his paper entitled 'The Imperative of Petroleum Support Fund (PSF) to Industrial Growth in Nigeria', presented at a meeting of The Nigerian Chamber of Commerce Industries, Mining and Agriculture (NACCIMA) Industrial and Small and Medium Scale Enterprises (SME) Group in Lagos, provides a historical perspective of downstream sector deregulation. According to him during the pre- and

post- independence era, certain companies were key players in the petroleum downstream sector in Nigeria. These were British Petroleum (BP), ESSO, Mobil Oil, Shell Nigeria Limited etc. The investments made by these companies were capital intensive; with the construction of jetties, depots, acquisition of rail tankers, wagons and network of retail outlets throughout the country. That was the genesis of the few oil marketing giants in the downstream sector later known as major marketers. The operations of these companies were market-driven by the forces of demand and supply and did not come under government control in terms of the fixing of petroleum products prices. This is the period of real deregulation as equipment and assets were wholly owned and operated by private companies and as mentioned above prices were determined by the market forces.

2.6.1 Regulation Period and the Advent of Fuel Subsidy:

Indigenisation and Nationalisation Policy

Oil subsidy in Nigeria started in 1973 (Oluloye 2006) when the Indigenization and Nationalization policy of the federal government became effective. By the Nationalization policy, according to NNPC (2010c) the federal government acquired controlling shares in major oil companies under what was termed 'First Participation Agreement' and under this agreement the federal government acquired 35% shares in the oil companies. The shares of these companies with the federal government out lay were managed by the government owned Nigeria

National Oil Corporation (NNOC), replaced by the Nigerian National Petroleum Corporation (NNPC) in 1977.

On 1st October, 1973 the federal government (F.G.) introduced uniform pricing of petroleum products nationwide (Oluloye 2006), which makes petroleum products available at prices less than cost in all parts of the country. Since the marketing companies are in business for profit under the Indigenization policy of the federal government the marketers preferred to sell products in major cities, seaports and refinery locations, where higher profits were made, mainly in the southern part of the country. In order to make products available in all the parts of the country and at a uniform price the government therefore introduced subsidy.

According to Asekunowo (2012) the subsidy scheme was targeted at low income Nigerians so that they were able to consume some necessary and essential goods and services from the production of which the petroleum products serve as necessary inputs. Adenikinju (2000) postulates that Nigeria as a major producer and exporter of crude oil has always controlled the domestic prices of petroleum products so that its' citizens could enjoy the price subsidy. According to him crude oil is sold to local refineries at a lower price per barrel to bring down the cost of production and enable Nigerians to enjoy explicit subsidy.

According to Asekunowo (2012 P. 302), there exists both explicit and implicit subsidies in the Nigeria's downstream sector subsidy scheme. The explicit subsidy is where the government pays the difference

between production costs and selling price, while the implicit subsidy according to him “involves the difference between the opportunity cost of a wasting asset such as crude oil and the present selling price”. Adenikinju (2000) shows that the implicit subsidy is the border or international market price of the petroleum products which Nigerian consumers do not bear. Hossain (2003) calculated the 2002 implicit subsidy to be ninety four billion naira or 1.8 percent of the GDP. He further asserts that as at 2003 the domestic prices of refined petroleum products in Nigeria were much lower than those obtained in the neighboring countries. According to him, during that year products were domestically sold at 80% of the importation cost. Domestically produced products were also sold at the same price, thus given rise to an explicit subsidy on imported products and implicit subsidy on domestically produced products. Nwafor *et al* (2006), shows that the explicit subsidy alone amounted to 2% of the GDP and if an implicit subsidy of 1.5% is added then the total subsidy would be about 3.5% of GDP.

Asekunowo (2012) shows that the explicit subsidy is administered through the sale of crude oil per barrel to local refineries through NNPC at a very low cost compared to international market price, so that the production cost will be reduced and bring about improved welfare to the consumers. Nwafor *et al* (2006) provides a clearer picture of the explicit subsidy in which they explained that in 1993 the export price of a barrel of crude oil was \$15 but the local refineries were buying it at \$1 per barrel. They further posted that in 2002 crude oil was sold at \$25 per

barrel at the international market but local refineries in Nigeria bought it at \$18 per barrel. As for the imported products, the authors further explained that the government does not sell them at their full landed cost because it subsidizes them. As at June 2003, the government spent 12 Naira as subsidy on each litre of petroleum product consumed in Nigeria. The figure rose to 78.45 Naira on each litre in 2011 (Muhammad, 2011).

2.6.2 Development in the Down Stream Sector (1973- 1975)

According to the report of the Independent Consolidation Committee on Cushioning Measures (FGN 2005) the period 1973 to 1975 was marked by severe shortages of petroleum products in the country. Long queues were observed during this period and filling stations charged different pump prices to reflect different transportation costs incurred by them.

This unhealthy development in the downstream sector attracted the attention of the Federal Government therefore, an inter-ministerial committee was set up to examine and advise the Federal Government on possible solutions out of the observed problems. The committee recommended the establishment of:

1. Nigerian National Petroleum Corporation (NNPC) with expanded mandate from that of Nigerian National Oil Company;
2. Establishment of more refineries, development of a network of pipelines and storage facilities nationwide for easy distribution of petroleum products in the country, besides the southern outlets; and

3. The establishment of Petroleum Equalization Fund (PEF) Management Board, to ensure the administration of uniform prices for petroleum products throughout the country.

The establishment of these organisations ensured the restorations of regular supply and distribution of petroleum products at uniform prices in the downstream sector of the oil industry in the country.

2.6.3 Development in the Downstream Sector (1980 – 1997)

This period was characterised by a gradual decline in infrastructural investment in the downstream sector, a sharp increase in national demand for petroleum products for local consumption and expansive projects, under funding of refineries. This led to frequent breakdowns and scarcity of products, fuel importation to meet the short fall in local supply of petroleum products, domestic price inflation and the depreciation of the exchange rate of naira to foreign currency (U.S. Dollar). And due to the introduction of Structural Adjustment Program (SAP) in 1986 adversely affecting the financial resource-base of the NNPC which engaged in the massive importation of petroleum products to meet the short fall in supplies from the domestic refineries, this resulted in sharp practices in the sale of petroleum products and made fuel subsidy very expensive (FGN 2005).

2.6.4 Deregulation Policy-implementation (1998-2012)

In 1998 the then Military administration formed another inter-ministerial committee to examine the problems of the downstream sector

with a view to; appraise all the ramifications of the deregulation of petroleum products supply and distribution, producing a blue print on the modalities for the deregulation program and making suggestions on measures including palliative measures to assuage the likely negative socio-economic effects of the deregulation exercise.

The committee completed its work and came out with the following recommendations:

1. The use of import parity principles in the pricing of petroleum products for local consumption;
2. The inclusion of adequate margins in the determination of domestic prices of petroleum products, for investors in the downstream sector, to enable them to recover cost.

These two recommendations among others were to encourage new entrants in the downstream sector to import petroleum products directly, to augment the domestic supply, which hitherto was only undertaken by NNPC (Oluloye, 2006).

On the 14th August, 2000 the Federal Government of Nigeria set up a 34 member Special Committee on the Review of Petroleum Products Supply and Distribution (SCRPPSD) drawn from various stake holders and interest groups to look into the problems of the downstream petroleum sector (PPPRA, 2004). According to this source, prior to the setting up of the committee, the downstream oil sector was characterized by scarcity of petroleum products leading to long queues at the service stations, low capacity utilization and refining activities at the nation's refineries,

rampant fire accident as a result of mishandling of products, products adulteration, pipelines vandalism, large scale smuggling due to unfavorable products boarders' price with the neighboring countries and low investment opportunities in the sector (Oluloye, 2006). The committee submitted its report in October 2000 with some far-reaching recommendations among which are: the privatization of the four government refineries and encouragement for the establishment of private refineries. The Government should deregulate and liberalize the import of petroleum products by other parties and that the prices of products should be based on import parity to enhance and encourage the participation of other players other than the NNPC, An establishment of a pipeline management authority for the management of pipelines and depots, which will charge both private and public users a tariff per throughput litre of product and the establishment of Petroleum Products Pricing and Regulatory Agency (PPPRA) to be embodied with the responsibilities of liberalization of the downstream sector of petroleum industry (Oluloye, 2006) .

The bill for the establishment of PPPRA was accented to by the President in May of 2003. Sote (2006), noted that with the establishment of PPPRA the mindset of the government is that it has phased out and ended fuel subsidy, moved to market based pricing, opened/liberalised downstream petroleum markets in a manner which encourages private sector investment and established a level playing ground for competition by industry participants for market and profits, reforms and strengthen

sector regulations in order to advance public interest and encourage competition in non-discriminatory basis, limit government involvement in the sector to policy formulation and fiscal matters; leaving commercial and investment activities to the downstream operators and regulating matters to PPPRA. Furthermore, government will also restructure or privatize NNPC subsidiaries in a manner that they will not hold and dominate market positions in a post-reform era to impede investment and competition.

2.7 DEREGULATION IN PERSPECTIVE

This section will dwell on the controversial issue of fuel subsidy withdrawal and the deregulation of the downstream sector of the Nigerian petroleum industry. Its design and implementation have invited labour strikes, which led to losses of several man-hours and growth opportunities in the economy. What then are the arguments involved? Nwachukwu and Chike (2011) attempted to find out whether or not government subsidy exists in the downstream oil sector in Nigeria. According to them the opponents of the removal of oil subsidy argue that the existence of fuel subsidy is a fallacy. On the other hand the proponents opinioned that the existence of fuel subsidy is a fact. Multiple linear regression was used to test their hypothesis and the result suggests that there is a significant relationship between the fuel demand and fuel subsidy and therefore concludes that there is empirical evidence that fuel subsidy is a fact and not a fallacy.

Deregulation, as a concept, seeks freer interplay of economic agents that enables market forces to dictate prices. Whenever market prices are at unacceptable levels, stakeholders (perhaps the most responsible of them all) can only intervene through the market variables of demand and supply, and not administratively. This is also the official position of the federal government of Nigeria. According to a paper issued by the office of the Chief Economic Adviser to the President in collaboration with the NNPC and the Budget Office of the Federation (2012), between 2006 and 2011, total government expenditure on fuel subsidy amounted to 3.7 trillion Naira. Expenditure on subsidies increased from N261, Billion Naira in 2006 to N673, Billion Naira in 2010, which represent an increase of about 160%. Additionally, there have been unprecedented payments in 2011 that as at August, 2011 amounted to 1.4, Trillion Naira. The paper continues to justify government stand by explaining that the government does not have any budget line for the subsidy. Even though estimates are made annually for it, the fact is that, the amount spent on subsidy is highly unpredictable, as some of the underlying factors are highly volatile like international price of crude oil, exchange rate, volume consumed etc. Deregulation is thus expected to remove these burdens on government and also remove bottlenecks in product distribution and lead to more efficient utilization of resources. Based on the above discussion the research question to be raised here is:

RQ: 2.1. To what extent will the regulation policy reversal and subsequently the introduction of deregulation through subsidy removal affect the economic growth of Nigeria?

At the heart of the deregulation of the downstream sub-sector is the controversy over appropriate pricing of petroleum products in Nigeria. The extremes have been whether the prices should reflect their full cost or contain subsidies, especially against obvious abuses and sharp practices in product sourcing and distribution.

Conceptually, the pricing of petroleum products can be done in the following ways:

1. Market-Based Approach; which prices are determined by the forces of demand and supply, within the constraints of existing market imperfections. It dwells on the principle of opportunity cost, so as to eliminate arbitrage opportunities.
2. Exhaustible Resource Theory; which originated from the intellectual work of Hotelling (1931). It recognizes that oil and other exhaustible resources are only temporarily available, and as such its price should be treated as user cost or depletion charge, which compensates future generations for a denial of access to the product.
3. Capital Replacement Approach (CRA); is based on the principle of cost recovery, covering production and refining cost. At the minimum, the price is expected to be consistent with the cost of replacing capital in the production process.

According to PPPRA (2004), Nigeria at present uses the market-based approach on the principle of import parity which meant increases in the prices of refined products along with the rise in world crude prices. But the above statement by PPPRA remains just a mere assertion because notwithstanding the deregulation, as at 2012 the federal government of Nigeria was and is still paying subsidy on both locally refined and imported petroleum products in the country. Business Day, (2012b) reported that NNPC owed \$7 billion on subsidy. Even, on the 1st January 2012 the federal government of Nigeria made an attempt to completely withdraw the subsidy and make domestic oil price to reflect international market price, but the policy met steep opposition from organized labour under the auspices of Nigerian Labour Congress (NLC) and Trade Union Congress (TUC) and other Civil society organizations on the ground that total subsidy withdrawal will bring inflation into the economy which will erode the real income of wage earners and increases the cost of production, which could force producers to cut down production and therefore, lead to the loss of jobs, thereby worsening the unemployment problem in the country. The industrial action embarked upon by the above mentioned unions forced the government to revert to subsidy payment. At this juncture the research questions to ask are:

RQ: 2.2 Will subsidy removals due to deregulation bring about inflation into the economy?

RQ: 2.3. Will subsidy removal due to deregulation bring an increase in the price of petroleum products and affect the minimum wage?

RQ: 2.4. Will subsidy removal via deregulation increase the prices of petroleum products and thereby increase the cost of production and bring about unemployment?

2.7.1 How the subsidy is financed:

Asekunowo (2012) provides a complete picture of the operations of Nigeria's downstream sector subsidy scheme. According to him NNPC and independent marketers import petroleum products into the country because as noted above the local demand for petroleum products is by far higher than the combined production of the four domestic refineries. While the combined daily production of the four refineries at full capacity is to refine 445,000 barrels, the daily demand as at 2011 was 30 million litres (Muhammad, 2011). Asekunowo (2012) further explained that independent marketers account for 67 percent of total imported volumes. The marketers import refined petroleum products into Nigeria from North-west Europe, which is the reference spot market on the basis of transaction cost, insurance and freight cargoes for diesel (AGO) and kerosene (DPK) and on free-on-board barges basis for petroleum (PMS).

Under this subsidy scheme there is a dedicated fund kept with the Central Bank of Nigeria called Petroleum Support Fund (PSF) which as mentioned earlier, was established to ensure uniform pump prices throughout the country. In order to participate in these scheme importers

must register with PPPRA. A registered company must give notification to import. Approval to import must be given by PPPRA based on the country's need of that product at that particular time and other requirements in the criteria list of the PPPRA. The imported product discharged must be witnessed and confirmed by PPPRA staff, staff of the Department of Petroleum Resources (DPR), the independent surveyors and the Nigerian Navy at the jetties. The importers' documents are verified and processed by the PPPRA and the DPR. The PPPRA determines the payments due to the importers and submit the verified documents and subsidy claims to the Federal Ministry of Finance and the documents are audited internally.

The Federal Ministry of Finance process and approves the audited subsidy claims and issue the authority to incur expenditure or a mandate to the accountant general of the federation. The accountant general of the federation issues the payment mandate to the central bank which as mentioned above is the custodian of the fund. The central bank credits the petroleum support fund with the amount of the subsidy claims. The PPPRA issues cheques to the importers on the basis of the auditor's report as accepted by the federal ministry of finance.

2.7.2 Problems of Subsidy Financing

2.7.2.1 False claims

Notwithstanding the above elaborate and stringent ways of making subsidy claims, some of the oil marketing and trading companies and

other independent marketers have evolved ways through which they claim subsidy money without importing a single litre of petroleum product into the country. Ailemen (2012) reported the indictment of 21 oil marketing and trading companies in Nigeria by the presidential committee on verification and reconciliation of fuel subsidy payments for collecting 382 billion naira which is over \$2.5 billion as subsidy claim under false pretense. In a separate report BUSINESSDAY (2012a) shows that the Economic and Financial Crime Commission (EFCC) has on July 19, 2012 arraigned seven oil marketers and twelve oil marketing and trading companies for alleged complicity in the fuel subsidy fraud. The accused were facing charges bordering on conspiracy, obtaining money under false pretense forgery and use of false documents.

2.7.2.2 Leakages

As mentioned earlier in the literature, the downstream sector of Nigeria's oil industry is characterised by the problems of smuggling, pipelines vandalism, and hoarding. All these activities constitute leakages in the domestic oil market. Asekunowo (2012), captured these sharp practices and shows a graphical illustration of the interplay between petroleum products subsidy and leakages and its implication on products availability in domestic market and subsidy sustainability.

In the graph below, the Nigerian petroleum products demand and supply were assumed to be at equilibrium at point *c* where the demand curve of petroleum products meet the supply curve at price OP_m and

quantity OQ_m . When the price was subsidised to OP_s suppliers were willing to supply only OQ_{ss} quantity of the product at point a while the consumers were willing to consume OQ_{ds} quantity of the product at point b a supply and demand gap will therefore exist. But because the Nigerian government pays what Asekunowo (2012) called explicit subsidy on per unit price of $OP_m - OP_s$ the gap will not exist and the market will continue to operate at point c where the slope of price OP_m intercept that of quantity OQ_m . Therefore, quantity OQ_m of the products will continue to be supplied in the market.

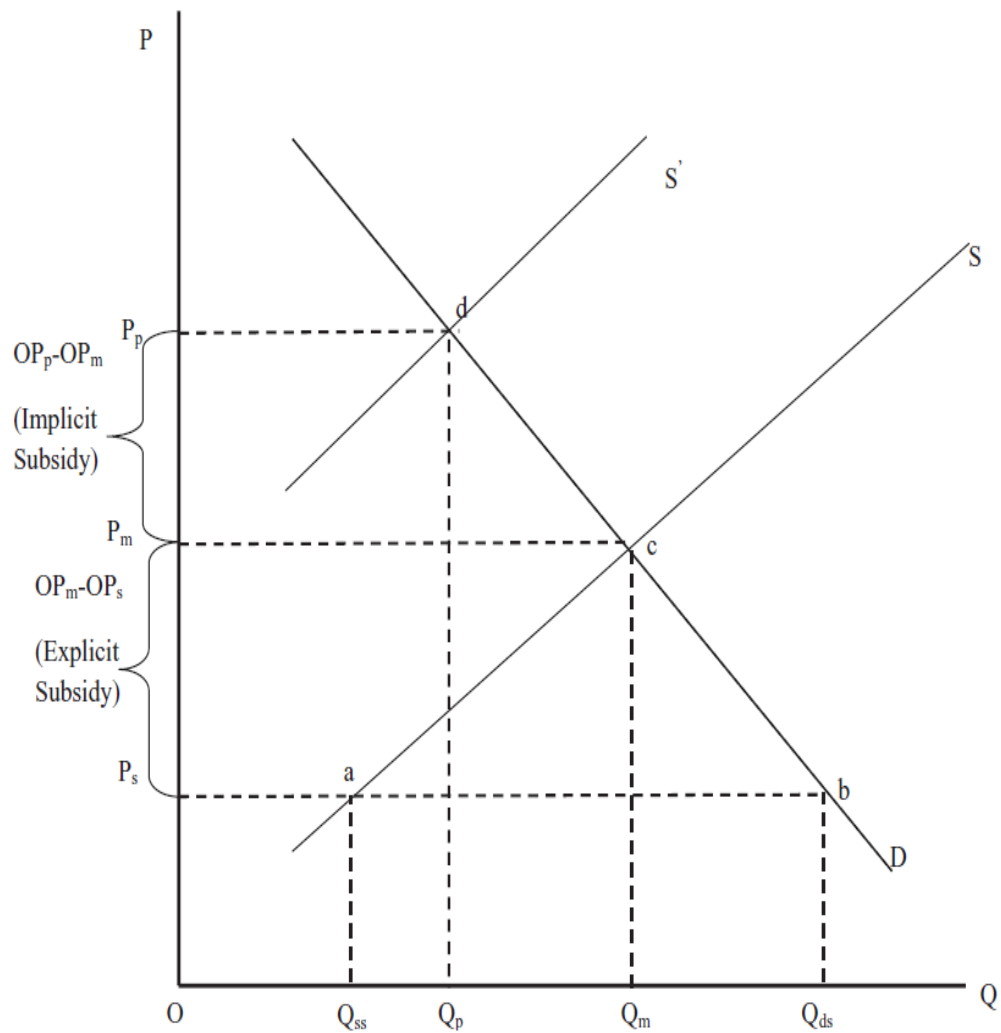


Figure 2.1 A graphical illustration of petroleum products' subsidy and leakages

Source: OPEC Energy Review September 2012

However, according to Adenikinju (2000) petroleum products prices are cheaper in Nigeria compared to its other neighboring countries; this has made smuggling of petroleum products to other neighboring countries highly profitable. So as economic saboteurs procure and smuggle large quantities of these products to the neighboring countries (Asekunowo, 2012) this shifts the supply curve of the petroleum products in Nigeria inward from S to S' which represent a decrease in supply.

Meanwhile the market price will rise from OP_m to OP_p , while only quantity OQ_p will be available for Nigerians to consume at point d , which means the government is now paying an implicit subsidy between OP_m to OP_p .

It is noteworthy to observe that since OQ_m is greater than OQ_p then the activities of smugglers and those engaged in product hoarding causes insufficient supply in the domestic market hence, long queues of vehicles has become a recurring phenomenon in the petrol stations in Nigeria which gives rise to black marketeering where the products are sold at much higher prices than the government subsidized ones. Table 2.1 below depict the various official prices of petroleum in Nigeria from 1966 – 2012.

Table 2-1: Fuel Prices In Nigeria from 1966-2012

S/N	Date	Price Per Litre	Regime	% Increase
1.	January 1966	84/5 Kobo	Aguiyi Ironsi	-
2.	To September 1978		Gowon	-
3.			Murtala /Obasanjo	-
4.	October 1, 1978	151/3 Kobo	Shagari	73.9%
5.	April 20, 1982	20 Kobo	Babangida	31.0%
6.	March 31, 1986	391/2 Kobo	Babangida	97.5%
7.	April 10, 1988	42 Kobo	Babangida	6.0%
8.	January 1, 1989	42 Kobo Comm &	Babangida	43.0%
		60 Kobo Private		
9.	Decem. 17,	60 Kobo For	Babangida	16.6%

	1989	All		
10.	March 6, 1991	70 Kobo	Shonekan	614.0%
11.	Nov. 8, 1993	N5.00	Abacha	361.5%
12.	Nov. 22, 1993	N3.25	Abacha	
13.	Oct. 2, 1993	N11.00	Abacha	
14.	Oct. 4, 1994	N15.00	Abdulsalami	127.0%
15.	Dec. 20, 1998	N25.00	Abdulsalami	
16.	January 6, 1999	N20.00	Abdulsalami	50.0%
17.	June 1, 2000	N30.00	Obasanjo	
18.	June 8, 2000	N25.00	Obasanjo	
19.	June 13, 2000	N22.00	Obasanjo	
20.	January 1, 2002	N26.00	Obasanjo	
21.	June 20, 2003	N40.00	Obasanjo	53.0%
22.	July 9, 2003	N34.00	Obasanjo	
23.	Oct. 1, 2003	N38.50 & N42	Obasanjo	
24.	May 29, 2004	N49.50	Obasanjo	
25.	January 2005	N50.50	Obasanjo	
26.	August 2005	N65.00	Obasanjo	28.71%
27.	March 2009	N75.00	Obasanjo	
28.	June 2009	N65.00	Yar'Adua	
29.	Jan. 2012	N141/97	Goodluck	117/49.23%
Sources: Daily Trust, Monday, January 2, 2012, Vol. 28, No. 56, (page 1) and Also Daily Trust, Monday, January 16, 2012, Vol. 28, No. 66, (page 1).				

2.8 CONCLUSION

From the literature reviewed in the above sections it was clear that prior to 1973 the Nigerian oil sector was operating on a free market basis where major oil marketers were the major players in the downstream oil sector. They made capital investments in the construction of jetties, depots, acquisition of rail tankers, wagons, and a network of retail outlets throughout the country. But in 1973 fuel subsidy was introduced and that marked the beginning of regulation period. It was also established from the literature that with the introduction of fuel subsidy and an Indigenisation and Nationalisation policy, the federal government acquired controlling shares in major oil companies. In 1977 the Nigerian National Petroleum Corporation (NNPC) was established which became a major player in the Nigerian oil sector. In fact NNPC is the owner of all oil pipelines, the depots and the domestic petroleum refineries in Nigeria and is the major importer and sole distributor of refined petroleum products in the country. Indeed despite the entire government clamor about deregulation there is not a single privately owned petroleum refinery in Nigeria today.

It was also established in the literature that petroleum products shortages and long queues of vehicles at the petroleum stations were first observed from the period 1973 when the subsidy regime started. The year 1973 and those that followed were also characterised by the gradual decline in infrastructural investment, sharp increase in the domestic consumption of petroleum products, under funding and

frequent break down of refineries, importation of refined petroleum products to meet the short fall in domestic supply, product scarcity due to the activities of hoarding, smuggling, pipeline vandalism, black marketeering and false claims. The combination of the above factors has turned the subsidy fund known as Petroleum Support Fund (PSF) into a bottomless pit through which government money is being siphoned which gives the government serious concern and hence the decision to deregulate the sector. Going by the issues rose in this chapter and based on the research questions raised in it, the hypotheses below were developed:

Hypothesis 1.0: There is no relationship between subsidy withdrawal at the downstream oil-sector and the economic growth of Nigeria.

Hypothesis 1.A: There is a relationship between subsidy withdrawal at the downstream oil-sector and the economic growth of Nigeria.

Hypothesis 2.0: There is no relationship between subsidy withdrawal at the downstream oil sector and inflation in the Nigerian economy.

Hypothesis 2.A: There is a relationship between subsidy withdrawal at the downstream oil sector and inflation in the Nigerian economy.

Hypothesis 3.0: There is no significant relationship between an increase in petroleum prices and unemployment rate in Nigeria.

Hypothesis 3.A: There is significant relationship between an increase in domestic petroleum prices and unemployment rate in Nigeria.

Hypothesis 4.0: There is no relationship between a subsidy withdrawal at the downstream oil sector and minimum wage in the Nigerian economy.

Hypothesis 4.A: There is a relationship between subsidy withdrawal at the downstream oil sector and the minimum wage in the Nigerian economy.

CHAPTER THREE

ANALYTICAL REVIEW OF LITERATURE ON THE DEREGULATION OF DOWNSTREAM OIL SECTOR

3.1 INTRODUCTION

When talking about deregulation of the downstream sector of oil industry especially in the context of Nigeria and other net oil exporting developing countries, the discussion is normally centered on subsidy removal and pricing (Birol *et al* 1995). As discussed in chapter two, deregulation in the Nigerian context involves gradual withdrawal of subsidy on petroleum products (table 2.1). However, according to PPPRA (2004), deregulation in the downstream oil sector involves total withdrawal of government from paying subsidy on importation, refining, transportation, storage and pricing. The Government will only assume the role of a regulator of the industry.

In light of the above, the effect of deregulation within the context of this study is limited to subsidy withdrawal and pricing, because in Nigeria the focus of this study, is only on these aspects that have so far been affected under the deregulation policy, while other remaining aspects like importation, transportation and refining are still yet to be directly affected.

3.2 ANALYSES OF MACROECONOMIC THEORIES

The issue of the deregulation of downstream oil sector in Nigeria can be viewed within the context of five major macroeconomic theories these are the Classical, Marxists, Neoclassical, New Classical or Rational Expectation and Keynesians.

3.2.1 The Classical Economic Theory

The classical economic theory was promulgated by the early economists, such as Adam Smith (1723-1790) in his book 'An Enquiry into the Nature and Causes of the Wealth of the Nations' (1776); Thomas Malthus (1776-1834), in his 'Essay on the Principle of Population' (1798); David Ricardo (1772-1823) Iron Law of Wages and Jeremy Bentham (1748-1832), founder of Utilitarianism.

The main theory of classical economics was microeconomic in nature for it dealt with the determination of (relative) prices for and quantities of individual goods and services, the determination of relative incomes to individual factors of production and the determination of relative prices of classes of assets, real and financial. The classics' concentration on the analysis of growth and distribution of income tended also to be more general and their discussion integrated philosophy, economics and politics recommending laissez-faire, economic freedom and "the invisible hand".

Thus before the 1930s, to most economists the market functioned quite well and needed no additional policies. The views of the classical economists about the economy was first analysed by Adam Smith, who was believed to be the foremost classical economist, in his book titled 'An enquiry into the nature and causes of the wealth of a nation'; Adam Smith recommended a free market economy. That is an economy which is free from all sorts of regulations, restrictions and control on the part of the government.

According to him all economic activities should be left in the hands of private individuals. The decision of what to produce how to produce and for whom to produce should be allowed to be made by private sectors without the intervention of the government. He pointed out that the world is characterised by limited resources, and these limited resources can be efficiently and effectively allocated or made use of if only they are left in the hands of private individuals. According to him if the economy is allowed to function on the basis of free market mechanism, with the private sector championing the economic activities, there will be competition among them, coupled with the pursuit of their self-interest, and the resultant effect is that there will be efficient allocation of resources and production of quality goods and services. To Smith (ibid) in the presence of a laissez fair economy, each producer will seek to protect and promote his self-interest by way of maximizing his profit and in the process he protects and promotes the interest of the public even without his knowledge - "it is not out of the benevolence of the baker that we eat bread..." (Smith 1776). This is the implied position of the Nigerian government in introducing the deregulation policy, according to the Chief Economic Adviser to the Nigerian President (2012 p.1):

"Deregulation of the downstream oil sector will improve the efficient use of scarce economic resources by subjecting decisions in the sector to the operations of the forces of demand and supply. This will attract new sellers, buyers and investors into the market, thereby increasing competition, promoting overall higher productivity, increased product availability, improve efficiency in product distribution and, consequently, lowering prices over time. The ultimate effect of this chain of activities is

increased gains for the people of Nigeria who would be getting the most out of their natural resources”.

According to classical economists no economy is free from economic problems, but argued that such problems can be adequately taken care of by the “invisible hand” without government intervention. The natural force, as it is otherwise called, is capable and powerful enough to solve any economic problem without the government necessarily having to intervene. This has buttressed our alternate hypothesis 1.A raised in chapter two which read thus; there is positive relationship between deregulation of downstream oil sector and economic growth of Nigeria.

3.2.2 Marxists Theory

The critiques of classical economic theory like Karl Max (1867) argued that competition cannot lead to the efficient allocation of resources; rather it will lead to the concentration of wealth in the hands of the few.

According to Marx’s analysis:

“Competition gradually leads to the concentration of accumulated capital in fewer and fewer hands, since the largest, and therefore the most efficient, of the competing groups are bound to absorb and eliminate the smaller ones. The owners of smaller businesses are reduced to the status of proletarians.

However, while the number of exploited workers swells and eventually embraces almost the entire population, and while the degree of their poverty increases, so does the intensity of their wrath against their oppressors. The proletarian class is organised and disciplined by the very mechanism of capitalist production. The violent intervention by this class, together with the growing contradictions inherent in the capitalist system, will spell the doom of capitalism. Private property will be abolished by the expropriation of the few remaining super-usurpers by

the mass of the working people. The dictatorship of the proletariat will replace capitalist society, together with its super-structure of state, culture, and ethics". (Marx, in Gate Way Edition 1961 p.3).

The above doctrine could be the implied position or may represent the view of the Nigerian Labour Congress and other trade unions and civil society organisations in Nigeria who were on the streets in January 2012 protesting against the deregulation of the downstream sector of the Nigerian oil industry.

The classical economists' view was however, further supported by some other related theories such as; the neoclassical economic theory and the new classical or the rational expectation theory. These theories are further analysed below:

3.2.3 Neoclassical Economic Theory

Neoclassical economists like their classical counterparts are all pre Keynesians; they include economists such as Alfred Marshall (Principle of Economics 1890); AC Pigou (The Economics of Welfare 1924); Fredric Von Hayek (Individual and Economic Order 1948) and Dennis Robertson (1926). They generally favoured laissez-fair or minimal state intervention in the economy. They also demonstrate how supply and demand work to set prices, and how prices work to direct and control the economic system. Today most monetarists share neoclassical ideas.

However, neoclassical economics is associated with the marginality revolution of the mid-19th century and in the UK it was developed in the works of Jevons (1879); Marshall (1890) and Pigou (1924) which provide

the main theoretical underpinning to the contemporary theory. That is neoclassical economics grew out of the marginality (marginal utility theory) school of the latter part of the 19th century which developed economic theory on the basis of maximizing behavior. Such ideas according to Katzner (1988) were elaborated by Marshall (1890), Walras (1896) and others. This provides the theoretical underpinning to modern economic theory. The main policy conclusion of these theorists is that government intervention to regulate the economy was unnecessary and brought about distortions.

Since the mid-1950s there has been a resurgence of neoclassical economics, Friedman and Schwartz (1982). The monetarists emphasize the importance of money in explaining macroeconomic behaviour.

It should also be noted that the debate between Keynesians and neoclassical (monetarists) has evolved a common analytical framework for macroeconomic analysis which is called the Keynesian – Neoclassical synthesis or simply the “Neoclassical Synthesis”. Such neoclassical synthesis incorporates three elements which are: the Keynesian theory of aggregate demand; the basic model theory of aggregate supply and a theory of the adjustment of prices in a situation in which aggregate demand does not equal aggregate supply. Going by this theory therefore, the onus is on the Central Bank of Nigeria to evolve monetary policies on head line inflation to mitigate the possible inflationary effect of oil price subsidy withdrawal. This can be achieved through what Lescaroux and

Mignon (2008 p. 347) calls "inflation targets rather than only output targets".

3.2.4 New Classical / Rational Expectations

The new classical economists (NCE) tries to rebuild macroeconomic on micro foundations while maintaining the axiom that price adjust very quickly to clear markets. On the other hand, the crucial assumption of rational expectations hypothesis (REH) is that economic agents act rationally when they formed their expectations of the future, they do not waste information, but behave in the most efficient and economical manner that they can. They hold the view that individuals acquired, process and act on relevant economic information for their own enlightened self-interest.

The theory was originally introduced formally by Muth (1961) but today the leading protagonist of Rational Expectation Hypothesis is Robert Lucas (in Lucas Jr. and Robert E. 'On the mechanics of economic development' 1988).

The advocates of Rational Expectation Hypothesis, opined that any government stabilization policy which the government might decide to undertake and which the economic units like consumers, businesses and financial institutions might have "rationally expected" the government to undertake, would be doomed to failure.

Thus, the basic idea of Rational Expectation Hypothesis is that when economic decision makers expect the government to initiate a certain economic stabilization policy, then these decision makers will not

only take actions that will protect their businesses but they will also take decisions that will maximize their own gain in the light of the "rationally expected" effect of the government policy. As they do this, they will make it impossible for the government's stabilization policy to work. This theory could have explained the behaviour of oil importers and marketers in the downstream sector of the Nigerian oil industry. Whenever the government announced its intention to withdraw subsidy on petroleum products, the marketers as 'rational thinkers' will use the information to their own advantage and hoard the available products at their disposal and refuse to sell so as to take advantage of the newly increased prices and make huge profits after subsidy withdrawal. This creates product shortages, long queues in the service stations and higher product prices. However, there are scholars who faulted the doctrine that individuals behave rationally in their economic decisions. Leff (1974 cited in Ellickson 1989 p. 44) shows the short comings of the rational-actor theory of human behaviour which the rational expectations school of economic thought employs. According to him the new classical economists' model;

"In its purest form, is based on elegantly simple propositions about both cognitive capacities and motivations. The model assumes that a person can perfectly process available information about alternative courses of action, and can rank possible outcomes in order of expected utility. The model also assumes that an actor will choose the course of action that will maximize his personal expected utility, which may, of course, reflect a concern for the welfare of others. Leff further asserted, that the assumption of rationality exaggerates actual human cognitive capacities, and that, because a person's received utility is unobservable, the assumption of rational utility-maximization is strictly non falsifiable. A richer model for positive analysis, argued Leff, would look to psychology to develop a more realistic view of cognitive processes, and also look to sociology to obtain a more accurate picture of social influences on human behavior".

3.2.5 Keynesian Economic Theory

The great depression occurred between 1929 and 1933 but the classical economists at the time had neither a well-developed theory that would explain the persistent unemployment nor any policy prescriptions to solve the problem (Temin, 1994).

However, in 1936, John Maynard Keynes published his book *The General Theory of Employment Interest and Money*. His theory explained what had happened, what could have been done to prevent the depression, and what could be done to prevent future depressions. His explanation soon became accepted by most macroeconomists, in the process described as "Keynesian revolution". The essence of the Keynesian explanation of the great depression is based on the simple aggregate demand model hence the alternative name "demand-side economics".

Keynes shows that there was insufficient aggregate demand as well as the fact that an active stabilization policy was needed to maintain good economic performance. Consequently fiscal policy was given emphasis as the cure of insufficient aggregate demand.

To Keynes, the private enterprise economy using intangible money needs to be stabilized, can be stabilized and therefore should be stabilized by appropriate monetary and especially fiscal policies. Thus, Keynesians advocate detailed intervention to "fine tune" the economy in the neighborhood of full employment and low inflation. Keynesians seek

to use discretion in seeking to stimulate the economy in a depression and holding it back in a boom, modifying their policy in the light of current and best available forecasted immediate future events. To them, policy changes are best not to be pre-announced, so as to prevent speculations. Some of the key Keynesian economists include Franco Modigliani (1954) and James Tobin (1969), thus, Keynesian economics which had its heydays in the 1940s, advocates the necessity of government management of the economy by the use of fiscal policy to achieve full employment, price stability and growth. It tended to ignore the influence of money in explaining the behavior of macro variables.

From the analysis made so far on the above theories we can understand that Keynesian economic theory can be seen to present a moderate view away from the extreme classical view of total government withdrawal on one hand and their Marxists critiques who advocate the total dismantling of capitalism on the other hand. Keynes advocated a mixture of free market economy as well as state intervention where necessary. Therefore, from the above discussion it can be suggested that Keynesian theory could provide a better approach to understanding and solving the problem of subsidy withdrawal debate in Nigeria. The research question to be raised here is:

RQ: 3.1. Which economic theory will best suit Nigerian economy in relation to the deregulation of the downstream oil sector?

For a better understanding of the above theories it is pertinent to explain different types of economic systems which are products of these theories.

3.3 ANALYSES OF SOME ECONOMIC SYSTEMS

In this section, the focus is on the following economic systems: Free market (Capitalist) economy, Command (Socialist) economy and Mixed economy. It is the view of the researcher that the most fundamental issue underlying disagreements among economists, government, trade unions and other stakeholders on matters of deregulation of the downstream oil sector in Nigeria is that of the proper role of government in the economy. Roper and Snowdown (1987) argue that what ultimately leads to the choice of economic policy by any government may be on political rather than economic grounds. Although this choice may be justified by reference to economic theory, but undoubtedly, political considerations inspire economic arguments and vice versa; the domains of economics and politics overlap.

Roper and Snowdown (1987) observe also that economic theories provide rationales for government intervention in a market economy by identifying a number of areas where market can fail. However, it has also been recognized that government too can fail. Thus it therefore becomes a question of empirical study as to how much intervention or no intervention.

The economic systems to be considered in this research work are the following:

3.3.1 Free Market (Capitalist) Economy

It is based on private ownership and control of means of production, free choice of occupation and consumer sovereignty (free taste and choice). The ideology is that of accumulation of wealth and income. Income distribution, as observed by Scott (1979), becomes the function of market. That means market determines the returns of the factors of production. Lipsey and Chrystal (2004) argue that free market works in the framework of circular flow of income and voluntary exchange of savings for lending and investment firms. It could be said therefore that the use of market systems leads to efficient allocation of resources and efficient distribution of goods and services.

Roper and Snowdown (1987) have also observed that there is an element of price mechanism in a free market economy and this price system allows each individual to possess what they need and the rate those things are needed in relation to their income, tastes and preferences. They further opined that decision making on what to purchase by consumers and what to produce by producers have direct bearing with price. Therefore, price mechanism, forces of demand and supply and cost relationship determines what is produced and consumed. In other words, they are relied on the market system (price and profit). Under this economic system the buyers aimed at maximizing their welfare and or utility with the least expenditure. Producers on the other hand attempt to combine input that minimizes cost and maximizes output in order to make maximum profit (Koutsoyiannis, 1979).

According to Koutsoyiannis, (ibid), the market systems aimed at a series of price relation that tend to lead to a state of equilibrium at full employment. Roper and Snowdown (1987) have identified reasons why free market is desirable. They believe that government lacks the knowledge and information to allocate resources efficiently. They see government as using arbitrary power rather than incentives in its effort to allocate resources without market forces.

Those who support the deregulation of the downstream sector of the oil industry in Nigeria are more inclined to this type of economic system where Hayatudeen (2012) opines that price deregulation in the downstream oil sector in Nigeria is inevitable if the sector must continue to survive and develop. Adams (2012) also support the price deregulation where he argues that deregulated product prices will eliminate distortions in the market by promoting free competition on a level playing field. Other supporters of oil price deregulation in line with capitalist (free market) economic system in Nigeria are Braide (2012) and PPPRA (2004). They hold the belief that with price deregulation in the downstream oil sector the present system of a having uniform pump price throughout the country will give way to multiple competitive prices and the government will no longer be expected to set the price for petroleum products at the downstream sector of the oil industry nor will it be expected to pay any subsidy either on imported or domestically refined products.

But the problems identified with price deregulation in Nigeria are many and may not be solved by just applying the doctrine of free market

capitalist economy. The belief of trade unions, civil society organisations and human right activists in Nigeria are that the profound supply problems occasioned by abysmal neglect of domestic refineries contributes more to the problem of downstream oil sector than price deregulation. Thus they opined that if refineries are not effectively repaired and the supply problem continues, the result will be exorbitant import parity prices for products while refineries are idle and wasting. They argue further that price deregulation without local supply will only further encourage import and virtually seal all hopes of ever reviving the domestic refineries and gainfully utilizing the vast human and material assets therein. It will also seal the hope of building new refineries which could worsen the unemployment problem in the country (Ejikkegu 2004). According to him (ibid) what is called deregulation in Nigeria is not deregulation but rather an imperfect market, which is tantamount to Nigeria's reaction to the management of imported inflation. He says true deregulation will come when Nigeria refine its crude oil with its own labour and equipment, and sell to the downstream sector on the basis of the internal dynamics of the market.

3.3.2 Central Planning (Command) Economy

Marx in Jhingan (1978) observes that free market system has led to growth of monopolistic and oligopolistic tendencies in the economy thereby exploiting the people. This is what he sees as the factor that will lead to class struggle between the labour and the capitalists. He further stressed that this class struggle will eventually lead to the collapse and

end of capitalism. Thus, Marx predicted the evolution of socialist economic system.

Socialist economic system involves central planning; under this system there is a deliberate control and direction of the economy by central authority. The economic question, of what to produce, how to produce, and for whom to produce, is decided centrally by government. The central planning or command economic system is characterised by public ownership and control of the means of production, collective determination of economic decision and the allocation of resources by command issued by the planning elite (Jhingan 1978). As mentioned earlier the socialist theory and central planning economic system could be the preferred theory and economic system to follow as far as the organized labour unions in Nigeria are concerned.

Ropers and Snowdown (1987) presents Smith's argument, which prescribes an "austere economic role for the state". Smith believes that the state has three essential duties to perform: the state needed to protect the society first from external aggression, secondly from internal strife and thirdly, to maintain certain public institutions and public works which facilitates the commerce and enhance the welfare of the society. Smith himself was of the opinion that the afore mentioned duties of the state were related to a particular stage of development that the society had reached and he was pragmatic enough to realize that he was not attempting to establish a principle that will be applicable to all societies at all times.

From the above therefore, it shows that the extent of state intervention as argued by what Smith called the austere economic role for the state is a relative term which varies from one country to another and also varies according to the country's level of development. It is important to deduce from the Smith argument, therefore, that the state is allowed to intervene, however the degree of state intervention in the economy may be different from country to country and also depend on the level of the development of the country in question. Thus, intervention of Nigerian government in the economy during the regulation period in the downstream oil sector can still be considered as part of government responsibility to maintain public institutions in order to project the economy towards growth and subsequent development. Bearing in mind, that there was low domestic savings in the country and foreign direct investment (FDI) was not forth coming. So there was a strong need to support the domestic industries to achieve the governmental goal of industrialising the country. Therefore, it became an imperative policy then, to embark on central planning in downstream oil sector through ministry of petroleum resources in conjunction with Nigerian National Petroleum Corporation (NNPC).

However, opinions differed on factors that led to the decision to deregulate the downstream oil sector. Some argue that the inherent failure of government to properly allocate resources with no market has led to the call for free market (Gowland and Paterson, 1993). Some argued that the bureaucratic bottleneck of communication, which favours

no horizontal communication but rather vertical communication between economic units and planning agency has accounted for why free market has become necessary. This it was argued leads to delay in decision making. That is the implied position of classical economists like Smith. While some others are of the opinion that corruption and lack of transparency are the reasons why government insist on deregulating the downstream sector of the Nigerian oil industry (BusinessDay, 2012).

3.3.3 Mixed Economy

Although the term Mixed Economy did not get prominence until late 1940s after the Second World War the term and some policies that were later associated with it had been advocated from at least the 1930s. But the term got prominence in the 1950s which arose in the context of political debate in the United Kingdom in the postwar period. Advocates of the mixed economy, include R. H. Tawney, (1961), Anthony Crosland, (1974), Andrew Shonfield (1959), and Harold Macmillan (see H Macmillan 1969, 1971, 1972, 1994 and 2007). The critics of mixed economy are of the view that it is a move towards socialism and increasing the influence of the state, these include Ludwig von Mises (see Mises 1949 and 1960) and Friedrich von Hayek, (see von Hayek 1938 and 1947).

There is no single definition for the term mixed economy; however the available definitions always shows an interaction of private economic freedom mixed with a degree of government regulation of markets. The relative strength or weakness of each component in the national

economy can vary greatly between countries. Some countries have a strong private sector with minimum government regulation while some have strong government regulation and a weak private sector.

A mixed economy contains the features of both capitalist and socialist economy. Under this system there is both private and public ownership and control of means of production. Therefore, both government sector and private sector interact together to solve the economic question of what to produce, how to produce and for whom to produce.

The private sector under mixed economy engages into the business of buying and selling, transportation, own farms, factories, stores, warehouses, provide consultancy services and individuals participates in cooperative societies, manage enterprises and hire materials and labour services. In fact they participate in all businesses that are legitimate by law.

While the government uses tax money to intervene in areas such as the provision of subsidy in health care services, educational services, roads infrastructure, water for both human and animal consumption and for irrigation purposes. Other areas are subsidy on electricity, fuel and other energy services, agricultural research services and other development agencies and provide finances to, and pay benefits to unemployed, the aged and infirm. It also takes the responsibility of environmental protection, regulation of minimum wage, consumer protection, enforcing antitrust laws and the general maintenance of law

and order and the security of the country against internal and external aggression (Crosland, 1974).

From the foregoing, one can understand that a mixed economy is free from the two extremes of socialism and capitalism. Just like the Keynesian theory, it allows for free enterprise with government intervention to fine tune the economy and/or mitigate recession and stagnation in the economy. Perhaps this could explain the rationale behind the introduction of subsidy in the downstream oil sector of the Nigerian economy; to boost consumption at the household level and boost production at the firm level by subsidising producers through the provision of cheap energy to local industries. Mehlum *et al* (2006) indicates that more natural resources raise income when institutions are producer friendly. This is also consistent with the Keynes demand side theory which indicates that lower prices of products will make the household to consume more of it, and consequently rise the aggregate demand in the economy which will in turn bring about economic growth and development.

Having discussed the different theories and economic systems and the role they play in understanding the dynamics of and rationale for subsidy introduction and withdrawal in Nigeria, it is pertinent at this juncture, to analyse the concept of subsidy, types of subsidies and the conditions under which subsidies can be introduced or phased-out.

3.4 THE CONCEPT OF SUBSIDY

Having a generally acceptable definition of subsidies has proven difficult within the context of G-20 countries (IEA *et al* 2010). However, the World Trade Organisation (WTO) has provided a definition for subsidy that has been accepted by all its members. Article one of the agreement states that:

"A 'subsidy' exists when there is a 'financial contribution' by a government or public body that confers a 'benefit'. A 'financial contribution' arises where (i) a government practice involve a direct transfer of funds (example grants, loans and equity infusion), potential direct transfers of funds or liabilities (e.g. loan guarantees); (ii) government revenue that is otherwise due is foregone or not collected (e.g. fiscal incentives such as tax credits); (iii) a government provides goods or services other than general infrastructure, or purchases goods; or (iv) a government entrust or directed a private body to carry out one or more of the above functions. A 'benefit' is conferred when the 'financial contribution' is provided to the recipient on terms that are more favorable than those that the recipient could have obtained from the market" (ibid, 2010 p.8).

A more specific definition of fuel subsidy states that: "any government intervention that lowers the price of a fuel below its economic opportunity cost may be considered a subsidy" (Bacon and Kojima 2006 p.30).

IEA *et al* (2010 p. 10) conceptualise subsidy as:

"government intervening in markets in such a way as to affect costs or prices, by transferring funds to recipients directly, by assuming part of their risk, by selectively reducing the taxes they would otherwise have to pay, and by undercharging for the use of government-supplied goods or assets".

Going by the above definitions it is hypothesised that:

Hypothesis 5.0: Deregulation of downstream oil sector through subsidy removal will not result into higher prices of petroleum products.

Hypothesis 5.A: Deregulation of downstream oil sector through subsidy removal will result into higher prices of petroleum products.

3.5 TAXONOMY OF OIL PRICE SUBSIDIES

Bacon and Kojima (2006) have provided different schemes for price subsidies framework, they showed that subsidies can be implicit or explicit. According to them subsidies are said to be explicit when a sum of money is paid to the importers, transporters, refiners, wholesalers and retailers by the government. On the other hand the subsidies are implicit where possible government revenues are foregone through lower or zero taxes and by selling government owned crude oil to domestic market and or domestic refineries below international market price.

The different subsidies schemes according to Bacon and Kojima (ibid) are discussed below:

3.5.1 Universal Direct Subsidies

This can be further sub-divided into two elements. (i) Is the situation where all petroleum products are subsidised and this type of subsidy places a heavy burden on the economy. (ii) Is the situation where a particular type of fuel is subsidised for all consumers without restrictions in quantity purchased.

3.5.2 Cross-subsidies between Products

This is a revenue neutral subsidy where by the price of certain products rise by more than cost so that the price of others can fall below cost. Under this scheme the government will identify the products that are mostly consumed by the higher income segment of the society and those that are more intensely consumed by the lower income group and a subsidy is placed on the product that is mostly consumed by the lower income segment of the society for example, kerosene. Such a subsidy is aimed at providing protection to lower income groups through its redistribution effect because it leads to redistribution of the burden between users of different products.

However the cross-subsidies scheme has some drawbacks. The fact that it makes the price of some products cheaper in relation to others could lead to inter-product substitution and adulteration. For example, if the price of kerosene is subsidised significantly below cost, its price will be comparatively cheaper than other products such as diesel and gasoline, therefore, the tendency is that kerosene could be illegally added to these products and make the total demand for kerosene to be higher and make the cost of subsidy to the government also very high. Furthermore, this could make kerosene scarce for the low income group and the subsidy could benefit higher income group more than the low income earners thereby defeating the goal of introducing the subsidy in the first place.

3.5.3 Implicit Subsidisation by Reducing Product Taxation

Governments usually tax consumption of products through value added tax or sales tax but under implicit subsidisation scenario the taxes on petroleum products are reduced which lead to lower product prices, thereby subsidising the end users. This is a very common type of subsidy scheme and is easy to implement. However, its major disadvantage is that it leads to loss of revenue accruable to the government which could result to either a cut in government spending or an increase in government borrowing both of which negatively affects the economy, because a cut in government spending could affect the provision of infrastructural facilities and social services like the provision of education and health services, while a rise in government borrowing could affect future generation who will have to bear the heavy debt burden.

3.5.4 Cross-Subsidies between Groups of Consumers of the Same Product

This exists when the cost of petroleum products supply vary by region or location within the same country due to internal transportation cost arising as a result of proximity or other wise to refining or import location. A government may wish to have a uniform pump price policy for the whole country whereby all consumers pay the same price irrespective of their location, this will result in cross-subsidising remote consumers by consumers living nearer to points of refining or import. Financing this

type of subsidy requires a stabilization fund to neutralize the transportation costs of products across the country.

The problems of this type of subsidy lies in the difficulty in estimating reasonable transportation costs and ensuring that the products are actually delivered to the targeted remote areas and also ensuring that the products are sold at the government specified prices.

3.5.5 Indirect Subsidy on Downstream Petroleum Products

Under this arrangement the government subsidises a product that have much cost and is used by low income earners, like subsidising bus prices through providing diesel subsidies to bus operators. Since bus transport is mainly used by the lower-income segment of the society selling diesel at lower prices to bus companies will ease transportation cost on the low income group in both rural and urban areas.

3.5.6 Indirect Subsidy on Upstream Petroleum Fuels

This involves selling crude oil to domestic refineries at a price below the international market price, this is mostly done in oil producing countries where crude oil is sold to local refineries at a price below what is obtained in the international market thus subsidising the refineries with the aim that the reduced price be pass on to the consumers who will benefit from the implicit subsidy provided by the government through lower domestic crude oil pricing. This shows that the government has transferred some of its potential revenue from crude oil prices to subsidy's consumers of petroleum products. For this type of subsidy to

succeed however, governments must impose export taxes or export restrictions to avoid leakages through cross boarder smuggling which could cause product scarcity and black marketeering within the domestic market.

3.5.7 Targeted Subsidy

This is a subsidy aimed to provide relief to the lower income segments of the society so that they would be able to purchase some commodities which are considered essential for human existence. This is not a general subsidy because it excludes the high income group in the society who has the ability to pay higher prices. For targeted subsidy to be effective there should be a reliable data on the number of households to be covered by the scheme, a low cost method of reaching the targeted group and an effective monitoring system to guard against leakage and misallocation.

3.5.8 Income Subsidy

The effect of high oil price on the low income households can be countered through income subsidy scheme. The amount of the subsidy has direct bearing to the direct and indirect effect of higher oil prices on the poor. This type of subsidy avoids the disadvantages associated with other subsidy schemes discussed above, like excess consumption due to lower product prices, smuggling and inter-product adulteration.

3.6 FRAMEWORK FOR CONSIDERING SUBSIDY

INTRODUCTION

Having seen the different types of oil subsidy scheme, it is imperative at this juncture to show the framework under which the introduction of oil subsidy could be considered.

Bacon and Kojima (ibid) have provided three frameworks under which oil subsidy can be introduced. According to them countries can be classified into three: (i) nations that do not possess refining facilities; and these can be further classified into two, oil producing and non-oil producing (ii) a non-oil producing country with refining capacity and (iii) an oil producing country with refining capacity.

Under the first scenario that is a country without refining capacity, the domestic oil prices are arrived at by adding the import cost of products, wholesalers margin, retailers margin and taxes (this include both specific tax and value added tax). This could be expressed as;

$$P_R = (P_i + M + T) \times (1 + \tau) \quad (\text{Equation 3.1})$$

Where:

P_R = retail price per unit of a product.

P_i = per unit price of an imported product.

M = Domestic marketers margin (wholesale, retail, storage and internal transport).

T = specific tax on one unit of product sold.

τ = tax rate on one unit value of final sale.

If the government desires to bring down the price at retail level it can achieve that in four different ways.

- Pay a subsidy to importers in order to reduce the effective cost of imported product (P_i).
- Pay a subsidy to wholesalers or retailers in order to reduce the internal marketers margin (M).
- Reduce the specific (T) or value added (τ) tax rates.
- Reduce the final pump price (P_R) by paying a subsidy to retailers.

Closely related to the above scenario is the case of an oil producing country with no refining capacity therefore, it exports all its crude oil, so the price received is determined by the international price of crude oil less transport cost of exporting the crude to the international market (selling point). This can be expressed as:

$$\pi_D = \pi_W - F \quad (\text{Equation 3.2})$$

Where:

π_D = per unit price of crude received domestically.

π_W = per unit price of equivalent crude on international markets.

F = per unit cost of transporting crude to the world markets.

In the scenario above the export price of crude has no influence on the mechanism for introducing a subsidy on domestic petroleum products.

The second situation is that of a non-oil producing country with domestic refining capacity. The country has a choice of either importing refined petroleum product at the international market price or importing crude oil at the international market price and make use of its domestic refineries to refine it domestically. Whichever can guarantee lower prices after middlemen margins and taxes would be the one that will be prepared by the consumers. The cost of imported refined products is the same as the price of crude oil at international market plus international refining costs plus the cost of import freight. This may be expressed as:

$$P_i = P_w + R_w + F \quad (\text{Equation 3.3})$$

Where:

R_w = is the international refining cost per unit of product.

Under the above scenario three simplifying assumptions were made. First, the costs of freight in importing one unit of refined product and the equivalent amount of crude, and of exporting crude oil to the international market are all assumed to be equal. But in reality the cost of transporting refined product is always higher than that of crude. Second the cost of domestically refined products to the market and that of imported products are also assumed to be equal. Third, it is also assumed

that there is only one type of crude oil in the international market and there is only one single price of crude oil in the international market.

Going by the above assumptions the cost of products refined domestically at the refinery gate may be expressed as:

$$P_D = P_W + F + R_D \quad (\text{Equation 3.4})$$

Where:

P_D = per unit price of a domestically refined product.

R_D = domestic cost of refining on the equivalent unit of crude oil.

In a situation where the price per unit of domestically refined product (P_D) is higher than the import price of product (P_i) the government would need to take some measures in order to keep the domestic refineries in operation. These measures include; providing a subsidy which should be equal to the difference between the two prices, restrict the import of refined products or impose an import tax on the refined products. If a subsidy is provided, the retail domestic price of product reflects the import parity price as in Equation 1. Therefore, reducing pump prices could be done through the same mechanisms as those of a country that has no refining capability.

Finally a scenario with an oil producing country that has refining capacity is considered. Under this condition the country could either supply its refineries with domestically produced crude oil or import crude

from the world market. The cost at the refinery level of products refined from imported crude oil could be expressed as:

$$P_{DW} = \pi_w + F + R_D \quad (\text{Equation 3.5})$$

Where:

P_{DW} = cost of locally refined product acquired from imported crude.

On the other hand the cost at factory gate of refined products from domestically sourced crude oil may be similarly expressed as below:

$$P_{DD} = \pi_D + R_D \quad (\text{Equation 3.6})$$

Where:

P_{DD} = cost of locally refined product using domestically sourced crude oil.

Given that the price of domestic crude oil should be related to the international market price by the export parity equation 3.2, equation 3.6 may also be expressed as:

$$P_{DD} = \pi_w - F + R_D \quad (\text{Equation 3.7})$$

At this juncture the consumer choice would be that of the minimum of either imported products (equation 3.3) or locally refined products using imported crude (equation 3.5) or locally refined product using domestically sourced crude (equation 3.7).

It is worthy to note that it is difficult to make the cost of refining imported crude in domestic refineries lower than the cost of imported

refined products. However, refining domestic crude oil locally will be advantageous in the sense that the cost of crude produced locally will be lower than the cost of imported one by twice the transportation cost. Therefore, even if the domestic refining cost is higher than that of the international market ($R_D - R_W > 0$) the transport cost advantage will offset it especially if the following condition is satisfied;

$$R_D - R_W < 2F \quad \text{(Equation 3.8)}$$

Under the above scenario it will be more economical to use domestic crude in the domestic refinery, the zero transport cost advantage makes domestically refined products using domestic crude to be cheaper at refinery gate and that can allow for their price to be raised towards the product import parity level. This therefore makes it possible for another type of subsidy to be introduced, because prices of products do not necessarily have to be increased by import parity therefore the margin that could have been captured by domestic refining is transferred to consumers. Another option is to sell crude oil to domestic refineries at a price below export parity, thus foregoing part of the revenue that could have been available to the government if the crude were sold at world market.

In the next section the literature on deregulation of downstream oil sector will be reviewed and the way and manner through which it influences some major macroeconomic variables.

3.7 DEREGULATION AND MACROECONOMIC VARIABLES

The variables considered in this study are GDP, Inflation, Employment and Wages. The said variables are chosen because of their importance in explaining macroeconomic phenomenon not only on Nigerian economy but also on the economies of many other countries in the world. These variables have been used by many scholars to measure the impact of oil price changes on economic activities for example, (Hamilton, 1983, Mork, 1989; Mork and Olson 1994; Lee and Ratti 1995; Ferderar, 1996; Papapetrou, 2001).

The variables are also chosen for practical economic reasons, because they explain both direct and indirect effect of deregulation on the economy, for instance, the inflation variable will be measured to assess the direct effect of deregulation on changes in the price level in the economy whereas other variables like GDP, Wages and Employment are considered because of their direct and multiplier effects on the economy.

3.7.1 Deregulation of Oil Market and GDP

The relationship between fuel prices and GDP can be deduced via the supply-side effect, which indicate that rising oil prices are a pointer to the reduced availability of essential input to production, leading to a reduction in prospective output (Barro 1984, Brown and Yucel 1999, Brown and Yucel 2002, Abel and Bernanke 2001). Therefore, there is an upsurge in production cost and the growth of industrial output and

productivity are slowed. This has further justified the research question three raised in chapter two as to whether deregulation of the oil market will lead to higher cost of production and therefore affect production and by extension GDP negatively.

Another empirical study that show the relationship between oil prices and GDP was the one conducted by Hamilton (2005) and the theoretical link by Brown and Yucel (2002). Generally the findings of these studies tend to show that oil price increases have a negative effect on output.

To buttress the importance of oil price on GDP Maeda (2008 pp.1-2) asserts thus; "rising oil prices can fuel a slump across a country's domestic economy by raising production costs for companies". He further argues that "the International Energy Agency (IEA) calculated the effect of high oil prices on lowering gross domestic product (GDP) using a large scale computer simulation and issued a report on its findings (IEA 2004)". According to him the agency computed the rate of the decline of GDP in "several major countries by comparing two cases: a base line case showing what would happen if oil prices remained at \$25 per barrel for the five-year period starting in 2004, and a high price case showing what would happen if the price rose by \$10 to hit \$35 per barrel and remain at that level. The result showed that in the high price case, GDP would fall 0.3 percent in the United State, 0.4 per cent in Japan, and 0.4 per cent in the euro-zone countries". However, it is worthy of note that the above mentioned countries that were covered by the report are developed

industrialised oil importing countries therefore it cannot be concluded that the same scenario will be obtained in the net oil exporting developing country like Nigeria. Therefore the effect of high oil price on the GDP in Nigeria is subject to empirical study.

3.7.2 Deregulation of Oil Market and Inflation

When we consider Consumer Price Index (CPI), which is a proxy for inflation it is an indicative that an oil price increase represents an inflationary shock (Fuhrer 1995, Gordon 1997, Hooker 2002) that can be accompanied by second-round effects, through the inflation wage spiral. Other scholars that linked inflation to oil price movements include authors, such as Hooker (2002), Barsky and Kilian (2004) and LeBlanc and Chinn (2004). While the result of the study conducted by Barsky and Kilian (2004) indicated that oil price increase causes high inflation, LeBlanc and Chinn (2004) in their analysis suggests that high oil prices have only a moderate effect on inflation. It is worthy to note at this juncture that while Barsky and Kilian (2004) wrote on the US economy LeBlank and Chinn (2004) focus their study on G5¹ countries. The research question to be raised here is:

RQ: 3.2. What will be the effect of oil price change on inflation within the context of Nigerian economy?

¹ G5 countries are UK, US, Japan, Canada and Euro area.

3.7.3 Deregulation of Oil Market and Employment:

Effect of high oil prices on consumption, investment and unemployment was investigated by (Ferderer 1996), the result of the study shows that an increase in the oil price may have a negative effect on them all. According to him the effect on consumption can be understood via its relationship with disposable income, while the effect on investment is felt via raising firms' cost and increasing uncertainties, because a rise in oil prices diminishes the return of sectors that are oil intensive and the usual response to such circumstances by firms is scaling down or folding up leading to higher rate of unemployment.

However, according to scholars like Carruth, *et al*/(1998) who have studied the effect of oil price changes on the labour market, and Davis and Haltiwanger (2001) who investigated the influence of oil price dynamics on the natural rate of unemployment, the effect of oil price increase on the labour market can differ according to considered period either in short run or long run. Keane and Prasad (1996), in their study titled 'The Employment and Wage Effects of Oil Price Changes: A Sectorial Analysis' uses micro panel data to study the effect of oil price changes on employment and real wage in the United States of America (USA), their findings shows that increase in oil price negatively affects aggregate employment in the short run but increases it in the long run. According to them this could possibly be an indication of labour energy substitution in the production function and they therefore, concluded that oil price increases could lead to high unemployment in the short run, but

could generate more employment in the long run. The research question here is:

RQ: 3.3. What will be the short run and long run effect of deregulation on Nigeria's labour market?

3.7.4 Deregulation of Oil Market and Wages:

Keane and Prasad (ibid) used the data of the National Longitudinal Survey of young men with a sample size of 4,439 individuals and 23,927 persons per year observations based on interviews from 1966 to 1981. They find that the effect of an oil price increase on wages show a substantial decline in real wages for all workers but raised the relative wage of skilled workers. According to them real wages fell by 3% to 4% in the long run following an increase in the real price of refined petroleum products of 1-standard deviation around trend (19%).

Blanchard and Gali (2007) posited that an oil price increase leads to high wage and price inflation. Their study also finds that high oil price leads to a decrease in employment and output. In their paper titled 'imperfect competition and the effects of energy price increases on economic activity' Rotemberg and Gali (1996) find that high oil prices reduces real wages. They concluded that real wages fall by nearly one percent for each ten percent innovation in oil prices.

On the whole as noted by Lescaroux and Mignon (2008), various transmission channels exist through which oil prices may affect economic activity. This has generated numerous studies since the seminal paper of Hamilton (1983) cited in Lescaroux and Mignon (2008), who identified a

Granger-causal relationship between oil price changes and variations in macroeconomic indicators such as GNP (negative correlation), and the unemployment rate (positive correlation) in the United States. In both cases, the Granger causality ran from oil prices to macroeconomic variables. Burbidge and Harrison (1984) came to the same conclusion but using a slightly different approach in the UK.

3.8 ANALYTICAL REVIEW OF LITERATURE ON OIL MARKET DEREGULATION

3.8.1 Oil Market Deregulation Why and Why Not

The literature reviewed covers both side of the divide; on one hand there are the authors that write in support of deregulation and those that are against it.

Most of the writers that support deregulation hinge their arguments on improved efficiency in domestic demand by eliminating energy wastage, improved supply of fuel by attracting new investors into the sector who may want to take advantage of the deregulation policy and make profit since increased prices may result in increased profitability. Other factors are the increased revenue that will be available to governments as a result of saving the money that could have been spent on subsidy and the tax that could be imposed on the new investors. This is evident in the works of Birol, *et al* (1995), Chakravorty, *et al* (2000), Akpoghomeh and Badejo (2006) and Bazilian and Onyeji (2012).

As mentioned above the proponents of deregulation strongly advocate for the privatization of refineries, pipelines, depots and the total withdrawal of government from all products refining, importation, transportation, storage and pricing. The government should also abolished laws that restrict the importation of products and refining to some specific companies, which will expose the domestic oil market to the prices obtained in the international market (PPPRA, 2004).

Proponents of deregulation further shows the advantage of exposing domestic oil price to the international market price in the sense that it helps minimize energy wastage, increase incentive to conserve energy efficiently and remove barriers to the entry of cleaner energy services. They also assert that energy subsidies create a distortive price signal, in addition, it was argued that selling petroleum products below international market prices raises the tendencies for profitable smuggling, product hoarding and black marketeering.

The efficiency questions between private and state owned enterprises has also been advanced as one of the reasons for the need to deregulate. In their work Obaidan and Scully (1991) investigates the technical (managerial), scale and allocation efficiency difference between state owned and private for profit enterprises in the international petroleum industry. They posited that economic inefficiency is of three types; technical inefficiency, scale inefficiency and price or allocation inefficiency.

- i. Technical inefficiency is a situation where the actual inputs exceed the minimum required to produce the scale-efficient output with the cost minimizing input ratio.
- ii. Scale inefficiency can also arise when the actual output is less than the cost minimizing output.
- iii. Price or allocation inefficiency is a situation where the actual input ratio differs from the cost minimizing input ratio.

They observed that state-owned enterprises serves many masters and pursue multiple goals some of which are completely non-economic and sometimes political in nature, they are also controlled by ministries and the managers were appointed by political leaders, mostly based on political consideration rather than economic and technical expertise criterion, they are therefore sometimes influenced by political parties. Under this scenario therefore, it is very likely that resources will be allocated based on political criteria instead of the economic principle of allocation to highest-valued use.

They (ibid p. 238) further opined that "government subsidy and protection, coupled with the pursuit of noneconomic objectives, may lead to resources misallocation. Government employment policies prevail over staffing. Protection and subsidy policies may presumably poster a relaxed operational environment. These policies may distort the allocation of capital and material, and lead to over capitalization and low productivity".

The authors utilized the concept of frontier production function introduced by Farrelli (1957) for their empirical measurement of efficiency. The study concludes that based on the test for efficiency carried out by estimating an Aigner-Chu deterministic frontier function, a maximum likelihood stochastic frontier function and a maximum likelihood Gamma frontier function to test the relative efficiency of state owned and private for profit petroleum enterprises, the result shows that the inefficiency of state-owned enterprises compared to private enterprises remains robust. The empirical findings reveal that state-owned oil firms can satisfy the demand for their output with less than half of their current resource input compared to their privately owned counterparts. The authors conclude thus; "whatever the policy goals are that justify state ownership of petroleum sector, the evidence suggests that the efficiency losses of pursuing these goals are enormous" (Obaidan and Scully, 1991, p. 246).

However, notwithstanding the above arguments the opponents of deregulation maintained that an oil price increase through subsidy withdrawal may have negative effect on major macroeconomic indices like consumption, industrial output, investment, inflation, employment and wages. According to IEA *et al* (2010 p. 8), "policy makers usually justify energy subsidies with the argument that they contribute to economic growth, poverty reduction and enhance the security of energy supply". Therefore, oil subsidy withdrawal will raise the cost of production thereby adversely affecting productivity, real income and employment.

At this juncture it is relevant to analyse the deregulation of the oil market and higher oil prices and their effects on different economies in the world.

3.8.2 Review of Empirical Literature on Oil Market Deregulation in Some Selected Countries

Masih *et al* (2011) has studied the oil market price volatility on the macro economic variables in South Korea. The variables were assessed from economic and financial angle. The VAR model was used to capture the effect of crude oil prices on the South Korean economy covering the period of Asian economic crises of 1997 and the oil price hike of the early 1990s which happened as a result of the Gulf war. Cointegration technique was employed to test the long run relationship between oil price movement and economic activity using time series monthly data from May 1988 to January 2005. The results show that long run equilibrium relationship exists between oil price movement and macro economy in South Korea and the effect of high and volatile oil prices is felt in the entire sectors of the economy. The results also show a negative indirect effect on industrial production because it leads to high cost of production and low profitability which makes investors cut down investment. The research question to ask here is:

RQ: 3.4. Will change in petroleum price in Nigeria due to deregulation have indirect negative effect on industrial production due to the high cost of production and lead to loss of jobs and negatively affect employment?

Goto and McKenzie (2002) in their paper 'Price collusion and deregulation in the Japanese retail gasoline market' studied the effect of the deregulation of oil industry on the behaviour of retail prices in Tokyo and Osaka. According to them (ibid), in 1994 the Japanese government made it clear that by the end of March 1996 the law relating to the importation of some specified petroleum products (gasoline, kerosene, light oil) which restricts their importation to some certain number of companies will be abolished, the paper estimates model for the domestic retail price of gasoline based on game theory, focusing on forward looking behaviour of oil firms in the two towns. Monthly data for the period 1990:11 to 1998:5 was used. The data was divided into two parts; the first half was the pre deregulation period 1990:11 to 1994:5 and the second half of this period was when the decision to deregulate was made. Effective from 1994:6 to 1998:5; and the findings were that; notwithstanding the deregulation, total imports of the specified petroleum products relative to total production in the country remain very small, and total number of new importers of the said products also remain rather small, furthermore the wholesale price of the products has remained unchanged and yet at around the same time that the decision to deregulate the importation and abolish the law that restrict the importation to some certain companies was made and announced to the public the retail prices of the products began to fall.

It was concluded therefore, that this is consistent with the said game theoretic model which suggests that future changes in the

economic environment will affect current price settings by firms if the firms are faced with competition in a repetitive game context.

It can be hypothesized therefore that;

Hypothesis 6.0: Future changes in the economic environment as a result of subsidy withdrawal will lead to a fall in the petroleum product prices and so will not affect inflation positively.

Hypothesis 6.A: Future changes in the economic environment as a result of deregulation will lead to a rise in the petroleum product prices and so affects inflation positively.

In essence this theory has shown that expected future changes in the economic environment that exposes firms to competition through market deregulation do have an impact on the current pricing of their products which in the case of this study apply to petroleum products pricing.

Similar findings were made by Clarke and Edwards (1998) using a simplified general equilibrium model on Japan. Their findings revealed that there was a 13.2% reduction in domestic oil price and a consequent rise in the consumption of oil products by 4.6% by final consumer and 17.8% by intermediate users like power stations. Furthermore, domestic oil refining increases by 8.4%. The findings also show that the real GDP rises by about 0.13% and a 0.70% rise in real wage. At this juncture therefore the following hypotheses are raised;

Hypothesis 7.0: There is no relationship between subsidy withdrawal at the downstream oil sector and GDP

Hypothesis 7.A: There is a relationship between subsidy withdrawal at the downstream oil sector and GDP and;

Hypothesis 8.0: There is no relationship between subsidy withdrawal at the downstream oil sector and minimum wage.

Hypothesis 8.A: There is a relationship between subsidy withdrawal at the downstream oil sector and minimum wage.

Bello and Caverio (2008) conducted a study on the Spanish retail petroleum market which is the downstream sector of the Spain oil industry, and focus on the pattern of liberalization and competition since the deregulation of the market in 1992. According to them the Spain oil industry has been under strict government control from 1927 to 1984, the country's national oil company CAMPSA '*Compania Arrendataria del Monopolio de Petroleos S.A.*' held the concessionary right and conduct the exploration, production, refining and final distribution of petroleum products in the country. The period was characterised by low quality service, managerial, technical, scale and allocation inefficiencies this culminated into the decision to liberalize. However, it was discovered that from the year 1992 when the liberalization policy brought about competition in the downstream sector there was a significant rise in the number of service stations in the country from 4800 in 1992 to 8600 in

2005, furthermore this brought about structural changes in refining the products in the country.

The main finding of the study was that in only a few years the Spanish oil industry has moved from being a state monopoly condition to the condition of free market competition, which brought about retail market growth, development and modernization. It also gives the national oil company a good platform to compete with the newcomers in the industry. Another important finding was that different prices were charged for different quality of products, and deregulation of refineries and retail outlets eases price competition in the final market.

Birol *et al*, (1995), investigates the impact of oil subsidy removal on oil revenue and the energy sector in three countries, which are Algeria, Nigeria and Iran. The paper shows that subsidising consumption of petroleum products leads to domestic excessive demand which results in lower product availability for export thereby decreasing foreign exchange revenues that are needed as investment to stimulate the development process. Secondly subsidising producers bring about excessive supply which could lead to a fast depletion of resources which are the main source of foreign earnings of the countries in question. Thirdly, it was observed that switching to energy intensive production in these countries which are characterised by excess labour supply could worsen the unemployment situation in the countries and this could negatively affect growth. Fourthly, subsidies constitute a drain on

governments' budgets because of lower export availability and revenue sacrificed for subsidy, this leads to fiscal deficit and in some cases debt accumulation.

The paper also posits that subsidies in most cases do not benefit the segment of the society they are targeted to help – the rural and urban poor- but rather it is the rich that benefit most from it. Therefore, the income redistribution aim of the introduction of the subsidies in the first place is defeated.

Finally using a standard econometric approach the findings of the paper suggest that the effects of deregulation on government revenue and energy use efficiency could lead to substantial revenue saving. However, the authors were quick to add that "It is often believed that the removal of subsidies would lead to the suffering of the deprived segments of the population, while the extra output of oil (from reduced domestic consumption) would put down pressure on the world price, resulting in constant or even decreasing revenues", (Birol F. *et al* 1995 p.214).

Papapetrou, (2001) examines the oil price shock, stock market, economic activity and employment in Greece. She employed a multivariate vector-auto regression model to find the dynamic relationship between real oil price, interest rate, industrial production and employment rate. Two specifications were estimated, the industrial production specification and the employment specification. The result of

the impulse response function shows the responses of the four variables to oil price shock which indicated that an oil price shock has an immediate negative effect on industrial production and employment. Therefore, the paper concludes that oil prices play an important role in affecting economic activity and employment in Greece as oil price shocks explain a considerable proportion of the fluctuation in output growth and employment growth. It can be hypothesised therefore that:

Hypothesis 9.0: There is no relationship between change in oil prices and employment.

Hypothesis 9.A: There is a relationship between change in oil prices and employment.

Vladimir (2012) in his article titled 'Does oil price matter? A case of Czech Republic' investigates the effect of oil price movements on the main economic indicators of Czech Republic. More specifically the study dwells on the influence of oil price on GDP, Inflation and money supply (M1). Bayesian VAR model was employed to analyse the relationship. The study used three specifications for the oil prices to find out whether the change in oil price significantly affects the above mentioned variables either in linear, linear asymmetric or nonlinear asymmetric way. The finding shows that there is no significant impact of oil prices movements on the dependent variables. Therefore, it was concluded that oil price changes are not found to contribute significantly to the changes in GDP, Inflation and money supply in the Czech Republic.

In the United States of America (U.S.) the price of oil has tremendous influence on the economy; this is evident from the vast literature on the issue of oil price and the U.S. macro economy. Hickman *et al* (1987) had examined fourteen studies on the impact of oil prices on the U.S. economy that were conducted using econometric models alone, this is apart from the ones that were conducted based on empirical analysis. Foote, and Sneddon-Little, (2011p. 49) while analysing conference proceeding organized by Federal Reserve Bank of Boston titled 'Oil and the macro economy in a changing world' conclude that "economists concur that oil prices continue to have sizeable effects on the U.S. economy". In fact Hamilton (1983) has shown that all the post war U.S. economic recessions were always preceded with oil price shock except one recession which took place in 1960-61. He further stressed in his article titled Nonlinearities and the Macroeconomic effect of Oil Prices (2011) while referring to the 2007-2008 doubling of oil price in the international market and the recession that followed that 10 out of 11 U.S. economic recessions were preceded by sharp increase in oil prices. The Hamilton stand was concurred by the observation of the Boston conference participants who according to Foote, and Sneddon-Little, (2011p. 51) "had no trouble agreeing on the empirical regularity that large oil supply and price shocks generally precede U.S. recessions and tend to have a larger and more extended negative impact on the economy than the importance of oil in consumption or production would suggest".

Hamilton (2012), views higher oil prices as tax which the U.S. citizens pay abroad which in turn negatively affects their consumption of domestic goods and services. Edelstein and Kilian (2009) in their article titled 'How sensitive are consumer expenditures to retail energy prices?' indicated that the personal consumption expenditure (PCE) price index for energy goods by U.S. households increased by 68% in real terms between 2002q1 and 2006q3. The increase in expenditure on energy goods according to Hamilton means decrease in domestic consumption, which in turn results into low aggregate demand and therefore slows the growth rate of G.D.P. Hamilton explained further that about 5 per cent consumer spending in U.S. is on energy products. Therefore, if oil prices rise by 20 per cent and the consumers continue to consume the same amount of energy goods and services as before, then a pure income channel would imply that the U.S. consumer's consumption of other goods would fall by 1 per cent. However, the method of calculation of Edelstein and Kilian (2009) reveals that the consumption decline is much larger than the 1 per cent predicted by the pure income channel and the decline was spread out over many months. In fact the consumption decline in response to higher oil prices according to them is both larger and more protracted than the pure income effect would predict.

Another important effect of higher oil prices on the U.S. economy according to Hamilton (2012) is that higher oil prices tend to constrain firms to minimise as much as possible in the use of oil inputs which leads to a reduction in the amount of output that they produce; this in turn has

a general negative effect on output and aggregate supply in the economy. The Hamilton view here has concurred with the research question 1 raised earlier in chapter two which read thus; will subsidy removal via deregulation increase the prices of petroleum products and thereby increase the cost of production which will make producers to reduce production and bring unemployment in the economy?

Having analysed the concept of deregulation in its general form and meaning, and the way it affects macro-economic variables in different economies in the world, the next section reviews and analyses deregulation within the Nigerian context.

3.9 DEREGULATION IN THE NIGERIAN CONTEXT

Currently it is the government through Nigerian National Petroleum Corporation (NNPC) that imports fuel in Nigeria. Although private companies are also allowed to import, but when they make the importation the products are acquired by government for further distribution in the country while the importers are paid through the Petroleum Support Fund. Domestic transportation and product distribution is also wholly controlled by the government and where private companies are involved in the transportation of products, the companies are paid by the government through Petroleum Equalization Fund (PEF). While on the aspect of refining, it is the government that

owned and controlled all the four refineries that are operating in Nigeria today² (Asekunowo 2012).

Therefore, deregulation of the downstream petroleum sector in the Nigerian context “refers to the reduction or removal of government control, rules and regulations that restrains free operational activities in the sector. This does not mean a complete elimination of the laws that govern smooth operation of activities in the downstream oil sector. Rather, it means that the role of government in this sector will be limited mainly to providing regulatory oversight” (Office of the Chief Economic Adviser to the President, 2012 p. 1)³.

Therefore, for practical purposes this study dwells on the impact of deregulation transmitted into the economy through subsidy withdrawal and pricing because these are the aspects that have so far been affected by the policy, and that are the delimitation of this study, and this is where this work contributes to the frontier of knowledge. This is so because there is vast literature on the Nigerian oil industry ranging from environmental effect to developmental, yet there was no literature to the best knowledge of the researcher that deals with the effect of deregulation of downstream oil sector on the Nigeria’s economy.

² See section 2.7.1 in chapter two for detail analysis of the operation of the downstream sector of Nigerian oil industry.

³ Frequently asked questions on deregulation of the downstream petroleum sector and removal of petroleum subsidy, prepared by the Office of Chief Economic Adviser to the President in collaboration with the NNPC and the Budget Office of the Federation 2012.

Iwayemi and Fawowe (2011) have studied the impact of oil price shock on some selected macroeconomic variables in Nigeria; however, the oil price shock that was considered by them was the international price of crude oil not the domestic oil price as is the case of this study. They employ an unrestricted VAR to establish the relationship between crude oil price shock and some macroeconomic variables in Nigeria using quarterly data from 1985:Q1 to 2007:Q4. Their findings indicated that international crude oil price shocks do not have major impact on most macroeconomic variables in Nigeria. The research question to ask here is: RQ: 3.5. In what ways will the domestic oil price shock affect the Nigeria's economy?

Mordi and Adebisi (2010) analyses the asymmetric effect of international crude oil price shocks on output and prices in Nigeria using monthly data from 1999:01 to 2008:12. They used a structural VAR model and their study shows that oil price shock increases cost of production and is likely to decrease output. They further posit that higher oil prices lower disposable income and affects consumption negatively, and once the price increase is perceived to be permanent it will lead to decrease in private investment.

The above finding appears strange considering the fact that Nigeria is a net oil exporting economy where higher international crude oil price should translate into higher revenue for the country, but the paradox is that although Nigeria is a net crude oil exporter it is at the

same time importing refined petroleum products for domestic consumption.

Aliyu (2009) in his article 'Oil Price Shocks and the Macro Economy of Nigeria: A Non-linear Approach' presents an empirical assessment of the effects of crude oil price shocks on the real macroeconomic activity in Nigeria employing multivariate VAR model using both linear and non-linear specifications. His findings reveal evidence of both linear and non-linear impact of price shock on real GDP. He further finds that asymmetric price increases in the non-linear models have positive impact on real GDP growth of a larger magnitude than asymmetric oil price decreases adversely affects real GDP.

In an earlier study titled 'Impact of Oil Price Shock and Exchange Rate Volatility on Economic Growth in Nigeria: An Empirical Investigation' Aliyu (2009) studies the impact of international oil price shock and exchange rate volatility on the economic growth of Nigeria using quarterly data from 1986:Q1 to 2007:Q4. He also uses VAR to examine the sensitivity of real economic growth to shock in crude oil prices and exchange rate volatility. The findings reveal that positive oil price shock and appreciation of the exchange rate have positive impact on real economic growth of Nigeria.

Bazilian and Onyeji (2012) analyse the effect of fuel subsidy removal on the businesses under inadequate public power supply condition. Their findings shows that businesses in many developing countries like Nigeria where there is inadequate public power supply

suffer from high cost of providing self-energy in the form of stand by generator and other similar means of generating energy. This makes businesses in these countries to become less competitive because of high cost of production arising from inadequate power supply and high cost of petroleum products to fuel their machines and power generators as a result of deregulation policy.

In his contribution to the literature on the subsidy removal at the downstream oil sector of Nigeria Asekunowo (2012 p. 301) focused on the subsidy withdrawal debate to determine who is wrong and who is right in his article titled 'The economics of Nigeria's petroleum products' subsidy removal debate: Who is right? Who is wrong? After a lengthy analysis he concluded that "the review conducted revealed that the arguments presented by each side cannot be adjudged to have dwarfed the other" and he finally submitted that the poor "would suffer immeasurably if the subsidy is totally withdrawn".

Akpoghomeh and Badejo (2006) focus their attention to the study of petroleum products scarcity in Nigeria, in their article titled 'Petroleum product scarcity: a review of the supply and distribution of petroleum products in Nigeria'. The study identified the reasons for petroleum products scarcity in the country which according to them include sabotage, pipeline vandalism, banditry and poor maintenance of infrastructure. Therefore, they suggested the privatization of refineries, pipelines and depots as the solution to the problem.

In his work titled 'An analysis of the effect of the oil industry on economic development in Nigeria' Onosode (1998) discusses the effect of the oil industry on the development of Nigeria's economy between 1960 and 1995 using a Dutch disease macro model. The study concluded that it cannot be clearly stated that oil is actually a blessing or a curse to Nigeria, although it lead to the neglect of agricultural sector there was improvements in physical infrastructure and the provision of free basic education.

There are also literatures that covers the environmental aspect of the oil industry in Nigeria, the vast of them concentrate mainly on the oil spillage and environmental pollution that repeatedly takes place in the oil producing area of the Niger delta.

In his book titled 'The Political Economy of Oil and Gas in Africa: The case of Nigeria' Ariweriokuma (2009) dedicated a whole chapter discussing the environmental issues in the oil industry, where he analysis both the social and economic effect of environmental degradation caused by oil extraction industry in different parts of the world in general and in Nigeria in particular.

From the foregoing it can be seen that notwithstanding the vast literature on the Nigerian oil industry and its effect on the economic development, stock market development, effect of crude oil price shock and environment, there seems to be no literature on the effect of deregulation and subsidy withdrawal on the economy. This is what makes this work unique. Furthermore this work utilizes quarterly data which is a

higher frequency data in relation to what was used in other studies. This work also uses recent and up to date data.

3.10 CONCLUSION

In this chapter it was understood that deregulation of the downstream oil sector in Nigeria is based on gradual subsidy withdrawal on petroleum products. The chapter also touches on the theoretical underpinning of deregulation and the opinion of stake holders in the downstream sector which included the government, the trade unions and the civil society organisations about the proper role of government over the issue of subsidy and pricing.

Furthermore the conceptual issue of subsidy was analysed and the taxonomy of oil subsidy was carried out to show different types of subsidies that a government could provide for its citizens, depending on its level of development, resources endowment and macroeconomic policy target.

Added to the above, the framework for considering subsidy introduction was presented in the chapter, where countries in the world were classified into three groups, depending on their oil resources endowments. This consists of oil producing countries with refining capacity, oil producing countries with no refining capacity and non-oil producing countries with refining capacities, for each group of countries a comprehensive analysis was given on how subsidy could be introduced and sustained.

The chapter also reviewed literature on the effect of deregulation on some major macroeconomic variables such as G.D.P., Inflation rate, Employment rate and Wages, and presented the effect that were observed by various scholars based on the experience of their countries of studies.

The analytical review of the debate on the advantages and or disadvantages of oil market deregulation were also presented with detailed analysis of the arguments of scholars who were for and that were against deregulation.

The effect of oil market deregulation in some selected countries in the world was also analysed in the chapter. The countries covered were both oil producing and non-oil producing. This was done with a view to see the effect of deregulation on their economies, and the various studies reviewed shows that deregulation has positive effect on the economy of some countries and negative effect on some other countries.

Finally, literatures on the effect of oil industry on the Nigerian economy were reviewed, ranging from the effect of oil industry on the growth and development of the economy to environmental issues. It was discovered from the review however that of all the vast body of literature on the Nigerian oil industry, there was no study to the best of the researchers' knowledge on the effect of deregulation of downstream oil sector and subsidy removal on the economy. The vast majority of the literature and scholars mainly concentrates their efforts in analysing the effect of international oil price shock on the economy without paying

much attention to the dynamic effects of domestic oil price change on the economy. This is where this study hopes to contribute to the frontier of knowledge.

It is also worthy to note that the following empirical research questions and hypotheses were raised throughout the chapter and some of the research questions raised earlier in chapter two were also confirmed in this chapter.

The empirical research questions raised within this chapter are as follows:

RQ: 3.1. Which economic theory will best suit Nigerian economy in relation to the deregulation of the downstream oil sector?

RQ: 3.2. What will be the effect of oil price change on inflation within the context of Nigerian economy?

RQ: 3.3. What will be the short run and long run effect of deregulation on Nigeria's labour market?

RQ: 3.4. Will change in petroleum price in Nigeria due to deregulation have indirect negative effect on industrial production due to high cost of production and lead to loss of jobs and negatively affect employment?

RQ: 3.5. In what ways will the domestic oil price shock affect the Nigeria's economy?

The following research questions raised in chapter two have also been confirmed in this chapter.

RQ: 2.1 Will subsidy removals via deregulation increase the prices of petroleum products and thereby increase the cost of production which

will make producers to cut down production and increase unemployment in the economy?

RQ: 2.2 Will subsidy removals due to deregulation bring about inflation into the economy?

RQ: 2.3 Whether deregulation of the downstream oil market will lead to higher cost of production and therefore affect GDP negatively.

RQ: 2.4 Will subsidy removals due to deregulation bring an increase in the price of petroleum products and affect the minimum wage?

The research hypotheses developed in this chapter are;

Hypothesis 5.0: Deregulation of downstream oil sector through subsidy removal will not result into higher prices of petroleum products.

Hypothesis 5.A: Deregulation of downstream oil sector through subsidy removal will result into higher prices of petroleum products.

Hypothesis 6.0: Future changes in the economic environment as a result of subsidy withdrawal will lead to a fall in the petroleum product prices and so will not affect inflation positively.

Hypothesis 6.A: Future changes in the economic environment as a result of subsidy withdrawal will lead to a rise in the petroleum product prices and so affects inflation positively.

Hypothesis 7.0: There is no relationship between deregulation of downstream oil sector and GDP

Hypothesis 7.A: There is a relationship between deregulation of downstream oil sector and GDP and;

Hypothesis 8.0: There is no relationship between subsidy withdrawal at the downstream oil sector and minimum wages.

Hypothesis 8.A: There is a relationship between subsidy withdrawal at the downstream oil sector and minimum wages.

Hypothesis 9.0: There is no relationship between oil prices and employment.

Hypothesis 9.A: There is a relationship between oil prices and employment.

Finally, it should be noted that the chapter has also buttressed the alternate hypothesis 1.A raised in chapter two which read thus;

Hypothesis 1.A: there is a relationship between subsidy withdrawal at the downstream oil sector and economic growth of Nigeria.

CHAPTER FOUR

METHOD

AND

METHODOLOGY

4.1 INTRODUCTION

Choosing appropriate methodology and methods is very vital in any scientific research. This is due to the fact that there are different types of methods and methodologies available to researchers depending on what they are researching or what type of research they are conducting. When a researcher intends to measure some certain variables or verify existing theories or hypothesis or questioning them, then a quantitative method may well be the most appropriate tool to use. However, when a researcher intends to carry out research on ideas, beliefs systems, values, or describes and understands experience and other intangibles, then a qualitative method might prove more useful (Creswell 1994).

Apart from using either quantitative or qualitative methods there is also the possibility of a researcher using triangulation; that is using both qualitative and quantitative methods together. This approach is used to back up one set of findings from one method used – for example quantitative - with another method – for example qualitative – to see if the same or similar results will be arrived at.

There are certain assumptions underpinning the use of either quantitative or qualitative methods in research. These include ontological, epistemological, axiological, rhetorical and methodological (Burrell and Morgan 1994).

Under an ontological assumption the question is on the nature of reality. Quantitative approach assumes that reality is objective, particular and separate from the researcher, while qualitative approach assumes the reality to be subjective and multiple as seen by the participants in a study.

Epistemological assumption has to do with the relationship between the researcher and the researched. Quantitative approach assumes that the researcher is independent from that being researched while; qualitative approach assumes that the researcher interacts with that being researched.

Axiological assumption has to do with value judgment of the researcher. Under qualitative method the researcher is value-free and unbiased. However, under qualitative research methods the researcher is assumed to be biased and value-laden.

Rhetorical assumption refers to the language of the research; under quantitative method the language used is formal, based on stated definitions and uses accepted quantitative words and techniques. Qualitative method on the other hand accepts the use of personal voice, informal language, evolving decisions and accepted qualitative words.

Methodological assumption is about the process of the research, that is whether the process is inductive or deductive. Quantitative method is associated with deductive process, which means the reasoning is deduced from the general to the particular. It examines causes and

effect, and involves research leading to predictions, explanation, and understanding. Its reliability and accuracy is tested through a validity test. Qualitative method on the other hand is associated with inductive process, meaning the reasoning is from particular to the general. It involves mutual simultaneous shaping of factors and is context bound. Its reliability and accuracy is tested through verification (Creswell, 1994).

According to Creswell (ibid), research methods must necessarily address and adequately measure research hypotheses and research questions. Research methodology should describe in enough detail the methods to be used for the study in such a way that it can be replicated or be repeated in a similar way in another situation and obtain same or at least a similar result. Every stage of the methodology should explain and justify with clear reasons why the methods used were chosen.

In view of the foregoing therefore, for the purpose of this research quantitative research methodology is adopted, employing unrestricted vector autoregressive model with accompanying granger causality test, impulse response function and variance decomposition as tools of measurement, while Johansen cointegration test using both trace statistics and maximum engine value will be employed to test for the long run relationship between the variables under study.

The choice of quantitative method for this research was informed out of the fact that the variables considered in the study which are Inflation, GDP, Unemployment and Minimum wage are all numeric and

the data which is a time series data from 1980q1 to 2012q4 were also numeric. Measuring numeric data and variables that are numeric in nature requires quantitative approach. This is in contrast with the situation where categorical data and or variables are being tested, in such circumstances qualitative method might prove more effective.

4.2 DEFINITION OF VARIABLES AND DATA SOURCES

This study uses quarterly data from 1980q1 to 2012q4. The researcher intends to use data from 1960 when Nigeria recieved its political independence from British but the quarterly data for most of the variables from that period was not available.

Five variables were considered in this study, one independent variable and four dependent variables. Domestic oil price is the independent variable which is a proxy for subsidy withdrawal presented here as petroleum prices (PEP) while Inflation, Minimum Wages, Unemployment rate and GDP are the dependent variables. Empirical tests using time series data will be conducted to find the effect of petroleum price (PEP) change as a result of deregulation on the dependent variables. All the data are in logarithmic form except inflation rate and unemployment rate.

LGDP: Log of Gross Domestic Product at Current Basic Prices (N' Million). Gross Domestic Product is the market value of all goods and services produced in an economy over a period of time usually one year.

Quarterly data on GDP from 1980q1 to 2011q4 was obtained from CBN Quarterly Statistical Bulletin (2011), while data from 2012q1 to 2012q4 was obtained from CBN Quarterly Statistical Bulletin (2012).

Data collected on GDP will help the researcher to answer question 3.5 raised in the literature review chapter three which reads thus; in what ways will the domestic oil price shock affect the Nigeria's economy. It will also help the researcher to answer question 2.1 raised in literature review chapter two which read thus; to what extent will the deregulation of downstream oil sector through subsidy removal affect the economic growth of Nigeria?

Further to the above, the data will also help the researcher to test hypothesis 7 which was raised in the literature review chapter three.

It will in addition help the researcher to test hypothesis 1 raised in literature review chapter two which was also confirmed in the literature review chapter three.

INF: Inflation is the general increase in the prices of goods and services in the economy over a period of time usually one year. INF in this case denotes CPI inflation rate calculated as the first log difference of the consumer price index (CPI). Symbolically presented as $(\log(\text{cpi}) - \log(\text{cpi}(-1)))$. Quarterly data on CPI from 1980q1 to 2012q2 was obtained from the IMF's International Financial Statistics Data Base (IFS) (2012). While, the quarterly data on CPI for 2012q3 and 2012q4 were obtained from IMF (IFS) (2013).

Data on inflation will help the researcher to find answer to the research question 3.2 which was raised in chapter three which read thus; what will be the effect of oil price change on inflation within the context of Nigeria's economy. It will also help to answer research question 2.2 which was raised in chapter two which reads; will subsidy removal due to deregulation bring about inflation into the economy?

Furthermore, data on inflation will be used to test hypothesis 6 which was raised in the chapter three.

It will further be relevant in testing hypotheses 2 raised in chapter two.

LMINWAG: Minimum wage is the lowest remuneration paid to an employee by law. In Nigeria there is legislation on minimum wage termed minimum wage act. The government also has a minimum wage policy that stipulates the minimum possible amount of money to be paid as salary to a worker in government employment or in the private sector. The minimum wage changes from time to time and it is influenced by government policy and workers agitation through the activities of trade unions. Data on minimum wage was obtained from Central Bank of Nigeria Statistical bulletin (various years) which was also a compilation of data sourced from the National Salaries, Income and Wages Commission and the Federal Bureau of Statistics. The data was converted into natural logarithm form.

Data on minimum wage assists the researcher to answer research question 2.3 raised in chapter two which reads; Will subsidy removal due to deregulation bring an increase in the price of petroleum products and affect the minimum wages?

It will also help to test hypotheses 8 raised in chapter three.

It will also further help to test hypothesis 4 raised in chapter two.

UNEMPRT: Unemployment is a situation where people who are able and willing to work could not find any work to do. For the purpose of this research, the unemployment rate is measured as a total number of unemployed as a percentage of total population in Nigeria. Data on the reported unemployment rate was obtained from International Monetary Fund (2011): World Economic Outlook (Edition: September 2011).

Data collected on unemployment rate will be used to answer research question 3.3 raised in the literature review chapter three which reads thus; What will be the short run and long run effect of deregulation on Nigeria's labour market?

It will also help to answer question 3.4 Will change in petroleum price in Nigeria due to deregulation have indirect negative effect on industrial production due to high cost of production and lead to loss of jobs and negatively affect employment?

In addition to the above, the data on unemployment will further help the researcher answer question 2.4 raised in the literature review

chapter two which was also confirmed in the literature review chapter three and read thus; Q: 2.4 Will subsidy removal via deregulation increase the prices of petroleum products and thereby increase the cost of production which will make producers cut down production and increase unemployment in the economy?

The data will also help the researcher to test hypothesis 9 raised in the literature review chapter three.

It will further be relevant in testing research hypothesis 3 raised in literature review chapter two.

LPEP: This is the log of domestic petroleum prices obtained in Nigeria. The data on domestic petroleum price changes was sourced from Daily Trust Newspaper which published a detailed trend of domestic oil price changes from 1966 to 2012 (DailyTrust 2012).

Data on domestic petroleum price is important to this research because as it is the independent variable all the other variables in this study will be tested against the movement in domestic petroleum price. Added to that, the data also helps answer research question 3.5 raised in literature review chapter three which reads thus; in what ways will the domestic oil price shock affect the Nigeria's economy. It will also help test research hypothesis 5 which was raised earlier in the literature review chapter three.

It can be understood from the foregoing therefore, that the variables to be tested in this research are numeric and the data used which is in a time series is also numeric, therefore to test the effect of PEP on GDP, MINWAG, INF and UNEMPRT employing time series data makes the method of measurement to be quantitative. This has put the research within the realm of positivist approach in its methodology.

According to Wallace *et al* (2008) positivism in the social sciences research is mostly characterised by quantitative approaches, while interpretive on the other hand is usually associated with qualitative research methodology.

4.3 METHOD OF ECONOMETRIC MEASUREMENT

4.3.1 Unit root

As mentioned above, in this study we are going to consider the response of four macroeconomic variables to changes in domestic petroleum prices (PEP) in Nigeria. These variables are GDP, INF, MINWAG, and UNEMPRT for the period 1980q1 to 2012q4 a total of one hundred and thirty two observations. This shows that the data used is a time series data. Gujarati and Porter (2009) posited that empirical works based on time series assumed that the series are stationary. But in reality not all economic variables are stationary in their levels and some variables are non-stationary which means their mean, variance and covariance are not constant over time.

A non-stationary variable is one which has a trend; the trend could be stochastic or deterministic. If the trend is completely predictive and is not variable then it is called deterministic. On the other hand if the trend is not predictable and is variable it is called stochastic (Brooks, 2011). It is essential that variables that are non-stationary be treated differently because of unit root problem. In essence non-stationary data suffers from unit root problem or what is called stochastic or random walk. According to Gujarati and Porter (2009), non-stationarity gives rise to the problem of autocorrelation and spurious or nonsense regression. This is a situation where a very high R^2 (an indication of high statistical relationship) is obtained when regressing a time series variable on another even though there is no meaningful relationship between the two variables.

Brooks (2011, p. 318) provides a lengthy explanation on why the concept of non-stationarity is important. He posited that the stationarity or non-stationarity of a series "can strongly influence its behavior and properties".

If two variables are not related to one another it is expected that when one of the variables is regressed on the other the t-ratio on the slope coefficient would not be significantly different from zero and the value of R^2 would be expected to be very low. But the problem of non-stationary variable is that if two variables are trending over time a regression of one on the other could have a high R^2 meaning they are

statistically significant, even though in reality they are completely unrelated. This is because the dependent variable will follow the trend of the independent variable. In relation to this Brooks stated that "if standard regression techniques are applied to non-stationary data, the end result could be a regression that 'looks' good under standard measures (significant coefficient estimates and a high R^2), but which is really valueless" (Brooks 2011, p. 319). Such a model suffers from unit root problem.

Therefore, there is need to investigate the time series property of the data by conducting unit root and cointegration tests on the variables before proceeding with estimation of parameters in order to avoid spurious or nonsense regression. If a variable is non-stationary it could be made stationary by differencing. A variable is said to be integrated of order k ; denoted as $I(k)$ if it has to be differenced k times to make it stationary.

In this study two unit root tests are considered. They are Augmented Dickey Fuller (ADF) unit root test and Philips Peron (PP) unit root test.

4.3.2 Dickey Fuller (DF) and Augment Dickey Fuller (ADF) Unit Root Tests

The Augmented Dickey Fuller (ADF) test is an extension of the Dickey Fuller (DF) test correcting for autocorrelation (Asteriou and Hall,

2007). The DF test is based on an Auto regression of order 1, (AR(1)) model of the following form :

$$y_t = \rho y_{t-1} + \mu_t \quad (4.1)$$

Where y_t will be stationary of the estimated value if ρ is less than 1 and y_t will not be stationary of the estimated value if ρ is more or equal to 1.

Therefore, we check for:

$H_0: \rho=1$ (y_t is not stationary)

$H_1: \rho<1$ (y_t is stationary)

However, in practice hypothesis testing are available for 0 in the H_0 instead of 1. So if y_{t-1} is subtracted in both sides of equation 4.1 the following equation is obtained:

$$\Delta y_t = \delta y_{t-1} + \mu_t \quad (4.2)$$

Where $\delta = \rho - 1$. We thus test for δ as follows:

$H_0: \delta=0$ (y_t is not stationary)

$H_1: \delta<0$ (y_t is stationary)

The DF model however, suffers from autocorrelation and the test statistics may be invalid. ADF corrects for higher-order correlation by

assuming that the dependent variable y_t follows an AR (1) process and adding p lagged difference terms of y_t to the right-hand side of the test regression (Eviews 7 User's Guide II). The ADF test is based on the following equation:

$$\Delta y_t = \alpha y_{t-1} + x_t' \delta + \beta_1 \Delta y_{t-1} + \beta_2 \Delta y_{t-2} + \dots + \beta_p \Delta y_{t-p} + \mu_t \quad (4.3)$$

Where Δ is the difference operator, y_t is the dependent variable; y_{t-p} are the lagged differenced variables and μ_t is our error term. There are three possible models based on the presence of intercept and trend, because some variables have intercept and trend, some have only trend without intercept while some others have none.

4.3.3 Philips Peron (PP) Unit Root Test

The other test which is popularly applied to test for stationarity of a time series is the Phillips-Perron test. The Philips Peron test is a modified version of the ADF test by taking into account serial correlation in the error term. It makes minor assumptions concerning distribution of errors in contrast to the ADF which assumes the error terms are statistically independent and have a constant variance (Asteriou and Hall, 2007). The PP test does not include lagged differenced terms to correct for serial correlation in the auxiliary equation. Instead it uses a non-parametric adjustment for higher order serial correlation. The PP test regression is as follows:

$$\Delta y_{t-1} = \delta y_{t-1} + \mu_t \quad (4.4)$$

Where y_{t-1} and μ_t are as defined above. The PP test like ADF also has three possible models, trend and intercept, trend without intercept and none.

4.3.4 Cointegration

Unit root and cointegration tests can be thought of as a pre-test to avoid spurious regression situations. Regression of non-stationary time series on another non-stationary time series may produce a spurious regression, trended time series also creates major problem in empirical econometrics. Two or more variables will be cointegrated if they have a long term equilibrium relationship between them. Non stationarities have different properties over time hence difficult to generalize (Kozhan, 2010).

Econometricians have developed the concept of cointegration to address the problem of non-stationarity in time series data. This is because, even when variables contain unit root, there may exist a linear combination of them which is stationary. "Engle and Granger (1987) pointed out that a linear combination of two or more non-stationary series may be stationary. If such a stationary linear combination exists, the non-stationary time series are said to be *cointegrated*. The stationary linear combination is called the *cointegrating equation* and may be

interpreted as a long-run equilibrium relationship among the variables” (Eviews user guide II pg, 219).

There are two main cointegration techniques, the Engle-Granger two step techniques and the Johansen technique. The Engle-Granger approach involves the estimation of the cointegrating vector by ordinary least squares (OLS). However, the limitation of this procedure is that it cannot treat the possibility of having more than two variables, for this reason therefore, this study employs the Johansen approach.

The Johansen methodology extends the idea of an error correction model to a vector of variables. It avoids the limitations of the Engle-Granger approach based on VAR model estimation. Consider a VAR of order p below:

$$y_t = A_1 y_{t-1} + \dots + A_p y_{t-p} + Bx_t + \varepsilon_t \quad (4.5)$$

Where y_t is a k-vector of non-stationary I(1) variables, x_t is a d-vector of deterministic variables, and ε_t is a vector of innovations. The VAR may be rewritten as,

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + Bx_t + \varepsilon_t \quad (4.6)$$

Where:

$$\Pi = \sum_{i=1}^p A_i - I, \quad \Gamma_i = -\sum_{j=i+1}^p A_j$$

(4.7)

The Granger proposition states that if the coefficient matrix Π has rank $r < k$ then there will be $k \times r$ matrices of α and β each with rank r such that $\Pi = \alpha\beta'$ and $\beta' y_t$ is $I(0)$. The parameter r is the number of cointegrating relations and each column of β is the cointegrating vector. If the rank of Π is 0 then there are no cointegrating relationships (Khozan 2010). The elements of α are the adjustment coefficients in the VAR (Vector auto regressive model) model. Johansen's method estimates the Π matrix from an unrestricted VAR and tests whether the restrictions implied by the reduced rank of Π can be rejected (Eviews User Guide II, 2009).

Tests for cointegration are based on tests for the rank of the Π matrix. These are based on a transformation of Π to ensure that it has real eigenvalues and the tests are based on either the trace or the maximum eigenvalue of this transformed matrix. Johansen's likelihood ratio statistic tests the nested hypotheses below:

$H_0 : r = 0$ versus $H_1 : 0 < r \leq g$

$H_0 : r = 1$ versus $H_1 : 1 < r \leq g$

$H_0 : r = 2$ versus $H_1 : 2 < r \leq g$

$:$ $:$ $:$

$H_0 : r = g - 1$ versus $H_1 : r = g$

We present the Johansen likelihood ratio statistic, known as trace statistic as follows:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^g \ln(1 - \lambda_i) \quad (4.8)$$

Where r is the number of cointegration vectors under the null hypothesis and λ_i is the estimated value of the i th ordered eigenvalue from the Π matrix. The trace statistics investigates whether the smallest $g - r$ are statistically different from zero (Brooks, 2011, Kozhan 2010, Asteriuo and Hall 2007).

The maximum eigenvalue statistic where separate test on each eigenvalue was conducted is presented as follows:

$$\lambda_{max}(r, r+1) = -T \ln(1 - \lambda_{r+1}) \quad (4.9)$$

Where the null hypothesis is r , while the alternate hypothesis is $r+1$, so the null hypothesis is that there is no cointegrating vectors with the alternative suggesting that there is $r+1$ cointegrating vectors⁴ (Asteriuo and Hall 2007).

⁴ See Asterio and Hall page 328 for full explanation on cointegration test

4.4 MODEL SPECIFICATION: VECTOR AUTOREGRESSIVE

MODEL (VAR)

In this research work an unrestricted Vector Autoregressive model (VAR) is employed to examine the response of macroeconomic variables to changes in domestic petroleum prices in Nigeria. VAR is a system regression model used where there is more than one dependent variable.

This model has been used by Farzanegan and Markwardt (2009) to measure the effect of oil price shocks on the Iranian economy. VAR was also used by Olomola and Adejumo (2006) to examine the effects of oil price shocks on output, real exchange rate, money supply and inflation in Nigeria. Jimenez-Rodriguez and Sanchez (2005) also used VAR to empirically assess the effects of oil price shocks on real economic activities in a sample of seven Organisations for Economic Co-operation and Development (OECD) countries. In fact VAR has been frequently used to examine the relationship between oil prices and other macroeconomic variables since the work of Hamilton (1983) and Sims (1980). One of the advantages of this model is its ability to capture the relationship between different variables.

Consider the following Vector Autoregressive model:

$$y_t = A_o + \sum_{i=1}^p A_i y_{t-i} + \mu_t \quad (4.10)$$

Where y_t is a 5x1 vector of variables determined by p lags of all 5 variables in the system, μ_t is a 5x1 vector of error terms, A_0 is a 5x1 vector of constant term coefficients and A_i are 5x5 matrices of coefficients on the i th lag of y . Where $y_t = [LPEP, LMINWAG, INF, UNEMPRT, LGDP]$. Where PEP denotes petroleum price (domestic petroleum price in Nigeria), MINWAG denotes minimum wage, INF denotes inflation, UNEMPRT denotes unemployment rate and GDP stands for gross domestic product.

To examine the response of the above mentioned macroeconomic variables to changes in domestic oil prices, an unrestricted vector autoregressive model (VAR) is used. This model provides a multivariate framework where changes in a particular variable (domestic petroleum prices) are related to changes in its own lags and to changes in other variables (minimum wage, inflation, unemployment rate, and GDP) and their lags.

An important advantage of VAR is that all variables are considered as endogenous, therefore the problem of specifying which variable is exogenous or endogenous does not arise, so this has solved the problem of identification because for simultaneous equations structural model to be estimable, the requirement is that all equations in the system are identified (Asteriou and Hall 2007).

Brooks (2011 pg. 292) opined that “forecasts generated by VARs are often better than traditional structural models”. He posited that “large-scale structural models performed badly in terms of their out-of-sample forecast accuracy. This could perhaps arise as a result of the ad-hoc nature of the restrictions placed on the structural models to ensure identification” as discussed above. McNees (1986) cited in Brooks (2011) proves that forecast for some United States (US) macroeconomic variables like unemployment rate and real gross national product (GNP) were done more accurately using VARs than from some other structural specifications.

4.4.1 Granger Causality Test

In order to achieve the research objectives of determining the effects of deregulation of the downstream oil sector on Nigeria’s economy, the dynamic relationship between Petroleum price, Unemployment, Inflation, Minimum wage and GDP will also be explored by means of a Granger causality test. A causality test seeks to answer the basic questions of whether changes in domestic petroleum prices cause changes in the above mentioned macroeconomic variables. If this is the case then petroleum price (PEP) would be said to ‘Granger-cause’ the afore mentioned macroeconomic variables and the causality could be unidirectional or bidirectional.

4.4.2 Impulse Response Function (IRF)

When VAR is estimated it will be possible to assess the impulse response function. The impulse response function presents us with the possibility to assess the responsiveness of the dependent variables to shock to each variable and the effect on the VAR system over time could be noted. So, if there are k variables in the model a total of k^2 impulse responses will be generated. This is done through expressing the VAR model as a vector moving average, if the system is stable the shock will gradually disappear (Brooks 2011). Thus impulse response function is employed to assess the response of the above mentioned macroeconomic variables to shock in domestic petroleum price.

4.4.3 Forecast Error Variance Decomposition (VDC)

Added to this, the relative significance of a variable in generating variations in its own value and the value of other variables can be assessed through Forecast Error Variance Decomposition (VDC). In this study therefore, VDC will be used to assess the relative significance of changes in domestic Petroleum price in relation to GDP, Unemployment, Minimum wage and Inflation. According to Brooks (2011, pg. 300) variance decomposition "offer a slightly different method for examining VAR system dynamics. They give the proportion of the movements in the dependent variables that are due to their 'own' shocks, versus shocks to the other variables. A shock to the i th variable will directly affect that

variable of course, but it will also be transmitted to all of the other variables in the system through the dynamic structure of the VAR”.

An important issue in calculating Impulse response and Variance decompositions is the question of ordering especially when the Cholesky decomposition method is used because this method is based on the assumption of orthogonality which imposes the ordering of variables. According to Bidda (2010) “the implication of this is that reordering the variables in the system may lead to a number of different conclusions”. To avoid the above noted problem this study employs Generalised Impulse Response Function which is not sensitive to the ordering of the variables in the VAR system.

4.5 CONCLUSION

In this chapter an attempt was made to explain the methodology and methods employed in the empirical analysis of this thesis. It has shown that the variables considered for analysis are changes in petroleum price due to deregulation in the downstream oil sector in Nigeria. This is the independent variable, while GDP, minimum wage, inflation and unemployment are the dependent variables. The study covers the period 1980q1 to 2012q4, this shows that the data used is time series.

To carry out a valid analysis and arrives at an unbiased scientific result using time series data, some diagnostic tests need to be carried

out first on the time series properties of the data before proceeding with the estimation process. These diagnostic tests are unit root and cointegration tests. Depending on the outcome of the cointegration test either Vector Error Correction Model (VECM) or Vector Autoregressive Model (VAR) will be employed. When there is at least one or more cointegration relationship among the variables under study Vector Error Correction Model (VECM) will be employed. On the other hand when no cointegration relationship is established among the variables the Vector Autoregressive Model (VAR) will be employed to examine the response of the dependent variables to the shock on the independent variable. After estimating VAR the dynamic long run relationship between variables will be examined using Johansen cointegration technique employing both trace statistics and maximum eigenvalue. Granger causality tests will be conducted to measure the causal relationship between the variables. These will be followed by the impulse response function where the impulse response of the estimated VAR will be considered to assess the responsiveness of the dependent variables to shock to each variable and the effect on the VAR system over time. Finally Forecast Error Variance Decomposition will be considered to analyse the significance of changes in the independent variable on the dependent variables.

In summary the above are the econometric method and tests to be carried out on the variables and data used for this thesis so as to come up with a standard scientific empirical analysis and arrive at an

unbiased scientific result consistent with the assumptions of quantitative methodology approach.

CHAPTER FIVE

DATA PRESENTATION AND ANALYSES

5.1 INTRODUCTION

The main focus of this PhD project has been to examine the impact of changes in domestic petroleum prices in Nigeria as a result of subsidy withdrawal at the downstream oil sector on the economic growth of the country. This was carried out using four major macroeconomic variables which are; GDP, Inflation, Unemployment rate and Minimum wage rate.

In this chapter the data collected will be presented and analysed to show the impact of subsidy withdrawal at the downstream oil sector in Nigeria on the above mentioned variables. The aim of this chapter is to examine the response of Gross Domestic Product (GDP), Inflation rate (INF), Minimum wage (MINWAG), and Unemployment rate (UNEMPRT) to the changes in domestic petroleum price (PEP) following the subsidy withdrawal at the downstream oil sector in Nigeria over the period 1980q1 to 2012q4.

To achieve this, the empirical analysis begins with a look at the descriptive statistics of the macroeconomic variables. It then proceeds to examine the time series properties of the series to check for unit root using Augmented Dickey Fuller and Philip Perron tests. Serial correlation was also checked using Johansen cointegration test technique employing both Maximum Eigen Value and Trace Statistics to determine the long run relationship of the variables. Finally, an Unrestricted Vector Autoregressive Model (VAR) is estimated and resulted in Generalised

Impulse Response, Granger Causality and Forecast Error Variance Decomposition which were obtained and analysed. Results of the tests mentioned above were discussed in relation to the research objectives, hypotheses and research questions.

The analysis covers the implications of the results on the variables under study. It also covers the implications of the results on the Nigeria's oil industry in general and to the downstream oil sector of Nigeria, in particular, the implication of the policy on private oil companies, the independent marketers, the transport sector, the fixed income earners and the general economic and social effects of the subsidy withdrawal at the downstream oil sector in Nigeria.

The overall goal of the chapter is to come up with thorough empirical analyses of the advantages and disadvantages of subsidy withdrawal policy on the economy and provide suggestions on the conditions under which subsidy introduction or withdrawal can be effective in the economy. The chapter also aims to come up with recommendations on the workability or otherwise of subsidy withdrawal at the downstream oil sector given the macroeconomic conditions in Nigeria.

5.2 DESCRIPTIVE STATISTICS

Table: 5.1 Descriptive Statistics for GDP (N' million), MINWAG, PEP, UNEMPRT and INF for Nigeria (1980q1 – 2012q4)

	GDP	MINWAG	PEP	UNEMPRT	INF
Mean	1,910,042	2,879.845	22.90473	3.492248	0.044751
Median	670,619.8	250	15	3.4	0.034323
Maximum	10,048,574	18,000	141	4.7	0.201273
Minimum	11,241.89	125	0.15	1.7	-0.04795
Std. Dev.	2781019	4394.221	27.9018	0.968699	0.050722
Obs.	129	129	129	129	129

Source: Authors' computation using E-views 7.0 based on data from the International Monetary Fund (IMF) International Financial Statistics (2012; 2013), IMF World Economic Outlook, (2011), Central Bank of Nigeria (CBN) Statistical Bulletin (2012) and Daily Trust (2012)

Over the observation period 1980q1 to 2012q4, Nigeria had an average GDP of N1, 910,042.00 billion and the maximum over the period was N10, 048,574.00 billion while the minimum stood at N11, 241.89 billion. Focusing on minimum wage, the average of N2, 879.845 were observed over the study period with a maximum of N18, 000 and a minimum of N125.00. In terms of domestic petroleum price, the price of a litre of fuel averaged N22.9 per litre over the period under review. A further look at Table 5.1 shows that the domestic petroleum price in Nigeria was a minimum of N 0.15 with a maximum of N141. Looking at the reported unemployment rate for the period under review, the

reported unemployment rate stood at an average of 3.5%, a maximum of 4.7% and a minimum of 1.7%. Turning to inflation, the average rate over the period of observation stood at 0.04% with a maximum of 0.20 and a minimum of -0.04%.

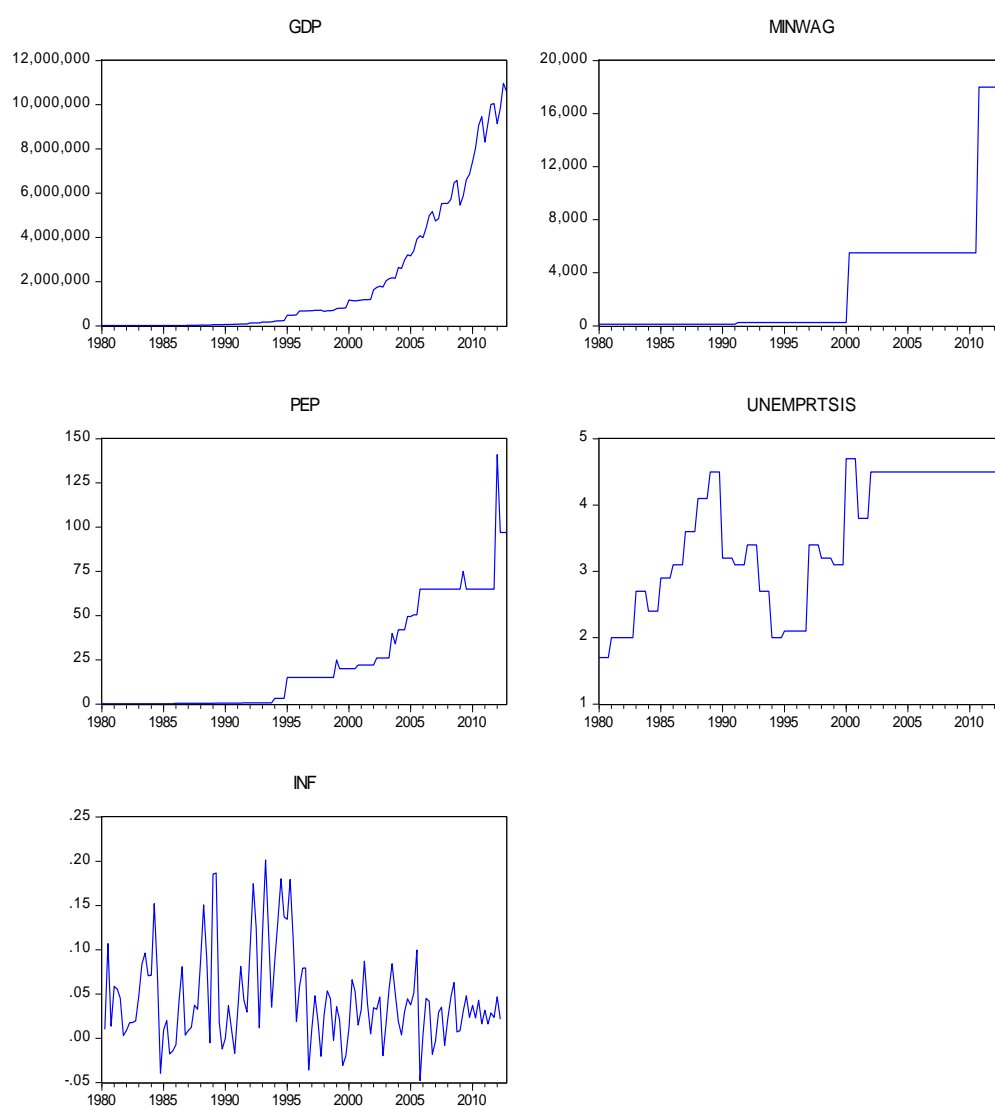


Figure 5-1: Graphical presentation of GDP, MINWAG, PEP, UNEMPRTSIS and INF 1980q1 – 2012q4

Source: Authors' construction using E-views 7.0

From figure 5.1, it can be observed that there is an upward trend in GDP, MINWAG and PEP, while UNEMPRT has an upward trend up to 1990 then it began to decline, it picked up again in the year 2000 and reached its peak in 2002 when it declined slightly during 2004 to date. The Consumer Price Index (CPI) which is the proxy for inflation rate has demonstrated an erratic behavior always reverting to the mean throughout the observation period. The reason of the upward trend could be an indication that the time series data of GDP, Minimum Wage, Unemployment rate and Petroleum prices are non-stationary. In other words from the table above there is some indication that these data suffers from the unit root problem⁵. However, this can only be confirmed after using standard econometric methods of testing for unit root. In this study Augmented Dickey Fuller and Phillip Perron tests are employed to check for unit root on the time series data used. Although using one test is enough to check for unit root, the second test was carried out to check the robustness of the result.

⁵ Detail explanation on unit root problem in time series data was given in chapter four of this thesis.

5.3 UNIT ROOT TEST

Prior to the stationarity test, a graphical presentation of the variables under study is presented below to find out whether or not they have a unit root at their levels and whether there is trend, intercept or both. For the statistical test to be conducted, data on Petroleum price (PEP), GDP and Minimum wage were presented in logarithmic form. While data on Inflation and Minimum wage are presented the way they are because both of them are rates.

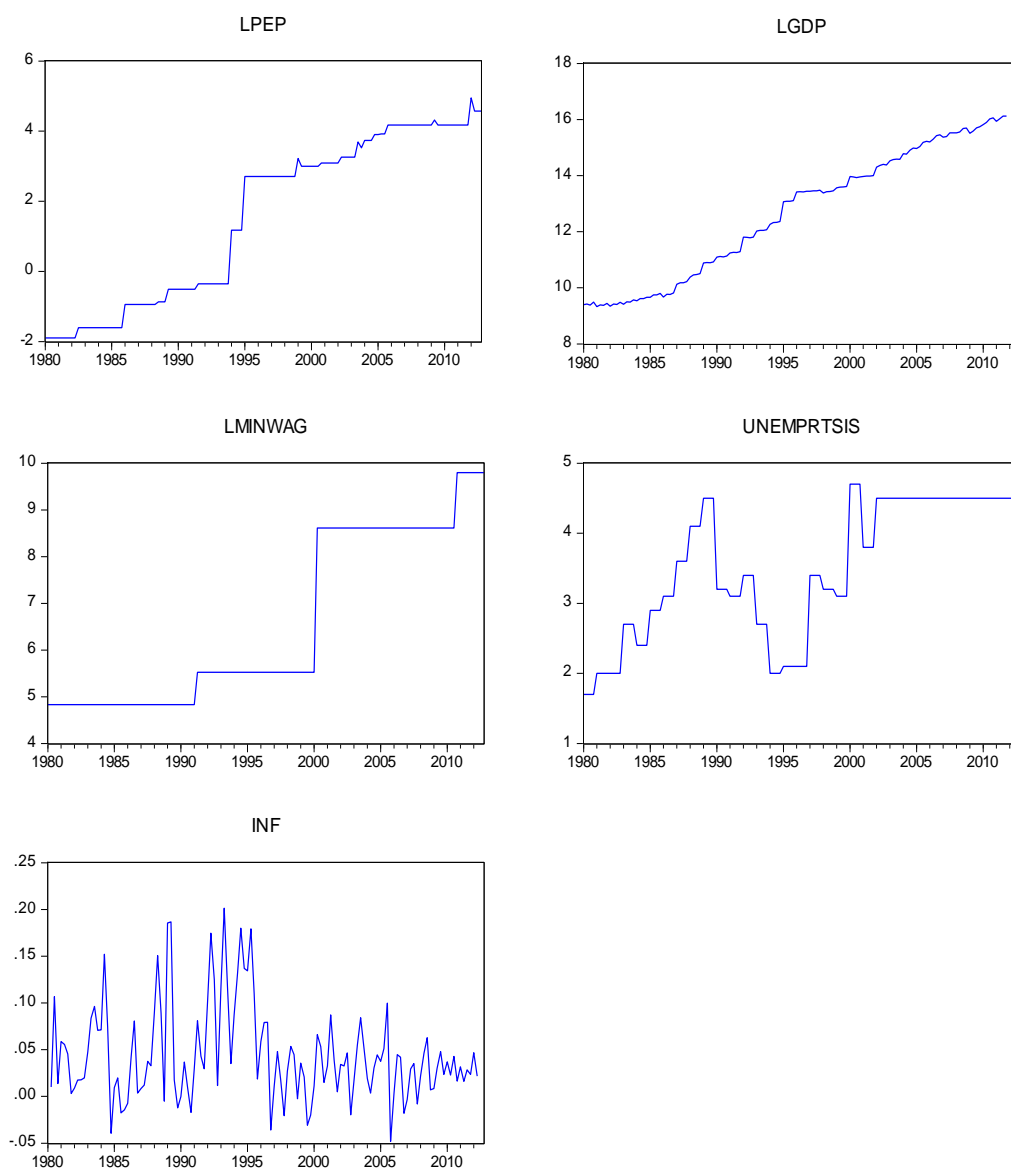


Figure 5-2: Graphical presentation of PEP, GDP, MINWAG, (in logarithmic form) UNEMPRT and INF (1980q1 – 2012q4)

Source: Authors' construction using E-views 7.0

From the graphs in figure 5.2 above it can be understood that all the variables except INF are trending upward which means they are non-stationary at their level and the graphs also shows that they have an intercept. Therefore there is need to test for stationarity using both trend and intercept. However, we still resort to formal scientific statistical tests to determine the order of integration of the variables. The stationarity of the variables was examined using Augmented Dickey Fuller and Philip Perron unit root tests and the results of both tests are presented in Tables 5.2 and 5.3 below:

Table 5-2 Augmented Dickey Fuller Unit Root Test Results

VARIABLES	LEVELS	FIRST DIFFERENCE	ORDER OF INTEGRATION
LPEP	-1.90	-12.85*	I(1)
LGDP	-2.02	-4.31*	I(1)
LMINWAG	-2.44	-11.51*	I(1)
UNEMPRT	-2.53	-11.35*	I(1)
INF	-3.80**	-11.73	I(0)

Note: *, ** and*, indicates significance at 1%, 5% and 10% respectively.**

Source: authors' computation using E-views 7.0

Table 5-3 Philips Peron Unit Root Test Results

VARIABLES	LEVELS	FIRST DIFFERENCE	ORDER OF INTEGRATION
LPEP	-2.05	-12.77*	I(1)
LGDP	-2.51	-12.61*	I(1)
LMINWAG	-2.45	-11.51*	I(1)
UNEMPRT	-2.49	-11.51*	I(1)
INF	-7.11*	-16.98	I(0)

Note: *, ** and*, indicates significance at 1%, 5% and 10% respectively.**

Source: authors' computation using E-views 7.0

From Tables 5.2 and 5.3 above it can be concluded that all the variables are non-stationary in their levels but they are stationary in their first difference with the exception of inflation which is stationary in its level. Therefore, LPEP, LGDP, LMINWAG and UNEMPRT are characterised as I(1) variables while INF is integrated to order zero denoted by I(0)⁶.

Under the above scenario we cannot continue to run a simple regression because it will give us spurious results (Brooks 2011). Therefore, the data has to be first differenced in order to make it stationary. There is also the need to run a cointegration test in order to see if in the long run, the variables move together having established the

⁶ See appendix 2 for the full results of both ADF and PP tests

fact that they don't move together in the short run. Since the variables are characterised as unit root processes.

5.4 COINTEGRATION TEST

Given that all our variables except INF suffer from the problem of stationarity which means they are $I(1)$ variables we need to test for a long term relationship by means of Johansen cointegration test. Non stationary series have different properties over time and are difficult to generalize (Kozhan, 2010). As mentioned earlier in the methodology section, econometricians have developed the concept of cointegration to address the problem of serial correlation in non-stationary time series data. This is because, even when variables contain unit root, there may exist a linear combination of them which is stationary. If such a stationary linear combination exists, the non-stationary time series are said to be cointegrated. Two or more variables will be cointegrated if they have a long term equilibrium relationship between them. The stationary linear combination is called the cointegrating equation and may be interpreted as a long-run equilibrium relationship among the variables (Brooks 2011).

Table 5-4 Results of Johansen Cointegration Test

Null hypotheses	Trace statistics	Critical value
$r=0$	41.85	47.86
$r\leq 1$	15.73	27.79
$r\leq 2$	6.86	15.94
$r\leq 3$	0.46	3.84
Null hypotheses	Max. Eigen statistics	Critical value
$r=0$	26.12	27.58
$r\leq 1$	8.87	21.13
$r\leq 2$	6.40	14.26
$r\leq 3$	0.46	3.84

Source: Authors' computation using E-views 7.0

Given that our variables of interest each contain a unit root and having established the order of their integration, the Johansen's procedure of maximum likely hood cointegration test was employed to examine their long run relationship using five lags as suggested by: sequential modified LR test statistic (each test at 5% level) (LR), Final prediction error (FPE) and Akaike information criterion (AIC)⁷.

A look at Table 5.4 reveals that both Trace and Maximum Eigen Value shows that there is no cointegration among the variables⁸ as we fail to reject the null of no cointegration. To determine the number of cointegrating relations, we can continue successively from zero to $k-1$ until we fail to reject (see chapter 4). To reject the null hypothesis, the Trace statistics and Maximum Eigen Value statistics must be greater than

⁷ Appendix 7 contains the full details of lag length selection criteria.

⁸ See appendix 4 for full results of Johansen cointegration tests

the critical value. From Table 5.4 above, we can observe that the Trace statistic of 41.85 is less than the critical value of 47.86. Thus we fail to reject the null that $r = 0$. Similarly, the Maximum Eigen Value statistic of 26.12 is less than the critical value of 27.58 and hence we cannot reject the null as well.

5.5 VECTOR AUTO REGRESSION MODEL (VAR)

According to Brooks (2008), Vector Autoregressive model (VAR) is a system regression used where there is more than one dependent variable. The main purpose of employing VAR for our empirical estimation in this study is that we have four dependent variables which are GDP, Inflation, Unemployment rate and Minimum wage. Using VAR allows us to evaluate the impact of changes in petroleum price on the four dependent variables under study. Employing VAR also gives us the opportunity to measure the response of the dependent variables to changes in petroleum prices through the use of impulse response function and to find the dynamic causal relationship and response among the five variables of interest that is domestic Petroleum Price, GDP, Inflation, Unemployment rate and Minimum wage, using Variance Decomposition and Granger Causality test. Results of these tests will enable the researcher to come up with empirical findings that could help policy makers and serve as a basis for future research.

The generalised impulse response function is employed to find out the mutual impact of shocks in domestic petroleum price on

macroeconomic variables in Nigeria. The impulse responses are illustrated in figure 5.3 and the variance decompositions are given in the table 5.5. While the Granger causality test results are given in table 5.6.

5.5.1 Generalised Impulse Response Function Test

In this study generalised impulse response was employed as against the use of Cholesky ordering. Under the generalised impulse response, causal ordering of the variables doesn't matter; while under Cholesky method different ordering of variables generates different results (Bidda 2009). The generalised impulse response shows how long and by what extent Gross Domestic Product (GDP), Inflation, Minimum wage, and Unemployment rate reacts to unanticipated changes in domestic petroleum prices. The horizontal axis measures the period after the impulse shock and the vertical axis measure the magnitude of the response.

The results of the generalised impulse responses for the unrestricted VAR in levels are presented for twentieth quarter time-intervals. The impulse response is presented along with a 10,000 Monte Carlo simulation and two-standard error band as in Bidda (2009)⁹.

⁹ Appendix 5 contains the full results of the impulse response function

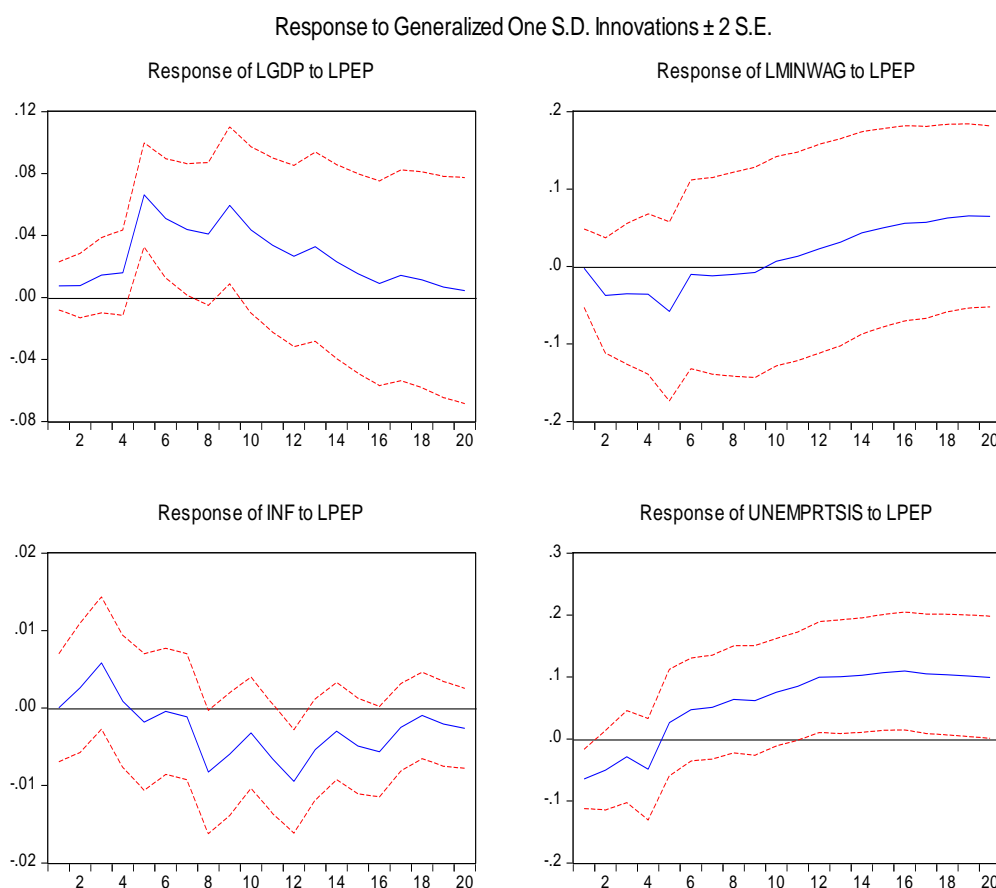


Figure 5-3 Impulse Response Function

Source: authors' computation using e-views 7.0

In response to a positive shock in domestic petroleum prices, there is a positive impact on GDP growth in Nigeria. It can be observed that in response to a shock in domestic price of petroleum, GDP responds positively peaking at the 5th quarter and then slowly dying down with spikes in the 9th and 13th quarter. This positive relationship persisted till the twentieth quarter. The response was also statistically significant between the 4th and 8th quarter.

This positive relationship is inconsistent with the classic supply side effect which argues that an oil price increase leads to increase in

production cost and ultimately leading to reduction in output and productivity and therefore has negative effect on GDP (Barro, 1984, Brown and Yucell, 1999, Abel and Bernanke, 2001). It is also inconsistent with the findings of Mirzaei H. (2007) who conducted research on an Iranian Business Cycle (A study of the Impacts of Oil Price Shocks) who finds a negative relationship between oil price shocks and output in the Iranian economy.

The result of this study is inconsistent with the findings of Mirzaei (2007) because although both Nigeria and Iran are oil exporting countries, yet Mirzaei conducted his studies based on international oil price shock on the economy of Iran, while in this study the focus is on domestic oil price shock on the economy of Nigeria. This is an indication that international oil price shock and domestic oil price shock could have different effect on the GDP growth of net oil exporting countries.

The observed positive relationship is also inconsistent with the findings of Hamilton (2005), who demonstrated a negative relationship between increased oil prices and output, but is consistent with the findings of Aliyu (2009) who finds a positive relationship between oil prices and real GDP growth in Nigeria. The inconsistency between the findings of Aliyu (2009) and that of Hamilton (2005) can be explained thus; that Hamilton conducted his studies on the USA economy which is an oil importing developed country, while Aliyu conducted his studies on Nigeria which is an oil exporting developing country. As an oil exporting

country, a positive oil price shock means increased revenue to Nigeria, which could be channeled into productive projects and therefore results into increased GDP growth. On the other hand positive oil price shock could raise the cost of input and affects GDP negatively in an oil importing country like America.

The import of Aliyu's result is that, an increase in domestic oil price is expected to generate higher revenue to the government and hence more resources are available for increased government spending and expansion of governmental projects in the economy.

Furthermore, the significance of this positive relationship as far as domestic oil price is concerned can be explained by the fact that by withdrawing fuel subsidy in the domestic market, the government will have more money available for other developmental activities.

Similarly inflation rates responds positively to a shock in the domestic petroleum price. The shock from domestic petroleum prices on inflation rate is positive up to the 4th quarter before reversing to a negative effect from the 5th quarter which persisted throughout the remaining quarters. The theoretical literature posits a positive relationship between oil price rise and inflation rate. As observed by Fuhrer (1995), Gordon (1997) and Hooker (2002), an oil price increase represents an inflationary shock which can be followed by an inflation wage spiral.

Turning to unemployment rate, a shock from domestic petroleum prices initially has a negative impact on unemployment rate in Nigeria, it becomes positive in the 5th quarter and it persists throughout the remaining quarters. This is consistent with the findings of Caruth *et al* (1998), David and Haltiwanger (2001) and Keane and Prasead (1996) who show that oil price increases tend to reduce unemployment rate in the short run but tend to increase it in the long run. It is also consistent with the findings of Papapetrou (2001) in his study on the economy of Greece.

As to the shock from domestic petroleum prices on the minimum wage, it is expected that theoretically the minimum wage will be influenced by changes in domestic petroleum price through its negative relationship with inflation which erodes the purchasing power of fixed income earners. A look at figure 5.3 reveals that the response generated was initially negative. While a further look at the impulse response reveals that it becomes positive from the 10th quarter up to the twentieth quarter observation period. This could be as a result of a wage increase by the government and multiplier effect in the economy to cushion the effect of subsidy withdrawal. This is consistent with the findings of Lescaroux and Mignon (2008) where they observed that, increase in oil prices erodes the purchasing power of the working class which makes them demand for increase in wages.

5.5.2 Variance Decomposition Test

The variance decomposition offers an alternative of examining the dynamics among the variables under study. It allows us to show the relative importance of an individual variable due to its own shock and the shock to other variables of interest. This test is used in this study in order to find out the percentage at which changes in domestic petroleum price causes changes in other dependent variables. Table 5.5 explains the percentages of the variations in macroeconomic variables that are attributed to domestic oil price changes. The variance decomposition indicates that Nigerian Domestic oil price changes are a significant source of variation for Nigerian GDP, Inflation and Unemployment. Conversely, a domestic petroleum price change has dismal effect on Nigerian minimum wage. Throughout the 20th quarters, petroleum price changes accounted for only 0.0% to 4.65% changes in minimum wage other than itself.

Table 5-5 Variance Decomposition

Variance Decomposition of LGDP:					
Period	LGDP	LPEP	LMINWAG	INF	UNEMPRT
1	100.0000	0.000000	0.000000	0.000000	0.000000
5	84.00037	10.67249	0.337467	3.623008	1.366666
10	77.69035	14.69969	0.458711	6.331674	0.819578
15	80.42957	10.98631	1.868574	5.740403	0.975136
20	81.41675	7.813484	3.574585	5.280486	1.914695

Variance Decomposition of LMINWAG:					
Period	LGDP	LPEP	LMINWAG	INF	UNEMPRT

1	0.074135	0.009955	99.91591	0.000000	0.000000
5	5.824871	2.553385	75.15818	5.282272	11.18129
10	5.046557	1.832837	70.15266	12.73158	10.23637
15	5.504898	2.386554	67.49677	13.28702	11.32476
20	5.854473	4.655233	64.67950	13.17978	11.63101

Variance Decomposition of INF:					
Period	LGDP	LPEP	LMINWAG	INF	UNEMPRT
1	10.87990	0.078043	0.262208	88.77985	0.000000
5	18.14418	1.732350	1.155241	78.82278	0.145452
10	20.45541	6.002800	1.956272	71.23312	0.352399
15	19.40719	12.10089	3.177001	64.71869	0.596227
20	19.23069	13.33472	3.350965	62.87766	1.205974

Variance Decomposition of UNEMPRT:					
Period	LGDP	LPEP	LMINWAG	INF	UNEMPRT
1	8.230958	7.080289	0.108062	1.280445	83.30025
5	11.28903	6.507133	1.913612	3.555636	76.73459
10	9.115437	11.64798	1.659461	9.872354	67.70477
15	9.041726	23.06547	2.139351	10.44976	55.30369
20	9.510138	31.59836	3.136480	10.19536	45.55966

Cholesky Ordering: LGDP LPEP LMINWAG INF UNEMPRT					
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Source: authors' computation using e-views 7.0

Coming to GDP, domestic oil price changes explains more than 10% of variation in GDP in 5th quarter, more than 14% by the tenth quarter, and then declining to more than 7% in the 20th quarter.

As for inflation rate, other than itself domestic petroleum price accounted for 0% to 13% of variation over the 20th quarters of observation. This demonstrates the importance of domestic oil price to changes in inflation.

When unemployment rate is considered, it can be seen that the changes in domestic oil prices accounts from, 7% to more than 31% of variations other than itself under the review period.

5.5.3 Granger Causality Test

In this study granger causality test is employed as against the use of correlation which is frequently the case in most studies; however, correlation does not imply causation because in some cases the use of correlation gives spurious results (Eviews 7 Help file). "The Granger (1969) approach to the question of whether x causes y, is to see how much of the current y can be explained by past values of x and then to see whether adding lagged values of x can improve the explanation. y is said to be Granger-caused by x if x helps in the prediction of y , or equivalently if the coefficients on the lagged 's are statistically significant" (Eviews 7 User Guide I, pp 428 - 429). In light of the above granger causality test was run on the variables LGDP, LPEP, MINWAG, INF and UNEMPRT and the result is presented in table 5.6

Table 5-6 Causality Analysis

VAR Granger Causality/Block Exogeneity Wald Tests
Date: 12/03/13 Time: 22:44
Sample: 1980Q1 2012Q4
Included observations: 122

Dependent variable: LGDP

Excluded	Chi-sq	df	Prob.
LPEP	31.36707	5	0.0000
LMINWAG	2.619767	5	0.7584
UNEMPRT	16.16815	5	0.0064
INF	7.636541	5	0.1774

All	64.99209	20	0.0000
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Dependent variable: LPEP

Excluded	Chi-sq	df	Prob.
LGDP	5.007211	5	0.4150
LMINWAG	1.339725	5	0.9308
UNEMPRT	8.939520	5	0.1115
INF	13.35182	5	0.0203
All	30.53169	20	0.0617

Dependent variable: LMINWAG

Excluded	Chi-sq	df	Prob.
LGDP	7.431293	5	0.1905
LPEP	1.898836	5	0.8630
UNEMPRT	20.74007	5	0.0009
INF	5.062685	5	0.4083
All	47.57407	20	0.0005

Dependent variable: UNEMPRT

Excluded	Chi-sq	df	Prob.
LGDP	7.530687	5	0.1841
LPEP	9.235556	5	0.1000
LMINWAG	2.384409	5	0.7938
INF	7.315058	5	0.1982
All	29.50887	20	0.0782

Dependent variable: INF

Excluded	Chi-sq	df	Prob.
LGDP	9.845999	5	0.0797
LPEP	8.866989	5	0.1145
LMINWAG	1.926413	5	0.8592
UNEMPRT	0.530343	5	0.9910
All	19.51074	20	0.4889

Source: authors' computation using e-views 7.0

To test for Granger causality, the block exogeneity test using Wald statistics are employed to test for the joint significance of each of the other lagged endogenous variable. There is a unidirectional causation running from LPEP to LGDP as we reject the null hypothesis that LPEP does not granger cause LGDP, but we do not reject the null hypothesis that LGDP does not granger cause LPEP. Therefore, it appears that Granger causality between LPEP and LGDP runs one-way.

There is also a unidirectional causation running from INF to LPEP. This is because although we cannot reject the null hypothesis that LPEP does not Granger-cause INF but we reject the null hypothesis that INF does not Granger-cause LPEP. Therefore, it appears that Granger causality between LPEP and INF also runs one-way.

According to the test results also, it was observed that LPEP does not granger-caused MINWAG neither does MINWAG granger-cause LPEP, because we cannot reject the null in either case. In the same vain when we consider LPEP and UNEMPRTSIS it can be concluded that there is no granger causality between them either way.

5.6 DISCUSSION OF FINDINGS

This section presents the discussion of research findings in relation to research objectives, hypotheses, research questions and results of various tests carried out in this chapter and other issues that were raised in the literature review chapters and the methodology chapter.

As indicated in chapter one, the main objective of this research is to investigate the effect of subsidy withdrawal at the downstream oil sector on the Nigerian economy, with specific reference to its effects on GDP, Inflation rate, Unemployment rate, and Minimum Wage. Going by the results of the various tests carried out on the quarterly time series data of the variables covering the period 1980q1 to 2012q2 it can be seen that the objectives of the research have been achieved. Results of Impulse Response Function, Granger Causality test and Variance Decomposition have shown the dynamic effect of subsidy withdrawal at the downstream oil sector on the Nigerian economy.

As stated in section 5.5 of this chapter, the result of impulse response function shows that subsidy withdrawal has a positive effect on inflation, in which case we reject the null hypothesis 5.0 which reads thus; deregulation of downstream oil sector through subsidy removal will not result into higher prices of petroleum products and accept alternate hypothesis 5.A which reads; deregulation of downstream oil sector through subsidy removal will result into higher prices of petroleum products.

The result also makes us reject null hypothesis 6.0 which read thus; future changes in economic environment as a result of deregulation of downstream oil sector through subsidy removal will result to a fall in the petroleum products prices and so will not affect inflation positively. We in turn confirm alternate hypothesis 6.A which read thus; future changes in economic environment as a result of deregulation of downstream oil sector through subsidy removal will result into higher prices of petroleum products and affect inflation positively.

In addition, the result makes us reject null hypothesis 2.0 which states that; there is no relationship between subsidy withdrawal at the downstream oil sector and inflation in the Nigerian economy and accept the alternate hypothesis 2.A which states that; there is a relationship between subsidy withdrawal at the downstream oil sector and inflation in the Nigerian economy.

This result is consistent with the findings of Barsky and Kilian (2004) who conducted their study on the US economy and finds that oil price increase causes high inflation. It is also partially consistent with the findings of LeBlanc and Chinn (2004) who finds that oil price changes has a moderate effect on inflation in their study on G5 countries. The result of this study is partially consistent with that of LeBlanc and Chinn (2004) because while LeBlanc and Chinn finds moderate impact of deregulation on inflation, this study finds statistically significant impact of subsidy withdrawal on inflation in Nigeria.

However this finding is inconsistent with the findings of Goto and McKenzie (2002) who conducted their study on the Japanese retail gasoline market and finds negative relationship between price deregulation, import deregulation and inflation in Tokyo and Osaka. It is also inconsistent with the findings of Clarke and Edwards (1998) who used a simplified general equilibrium model on Japan to arrive at the conclusion that deregulation of the downstream oil market resulted in lower product prices by 13.2%. It is worthy to note that the result of this study is inconsistent with that of Goto and McKenzie (2002) and that of Clarke and Edwards (1998) because the level of infrastructural development in terms of refining capacity for domestic consumption between the two countries is incomparable. While Japan has large scale modern petroleum refineries, Nigeria is maintaining old refineries. The latest of these refineries was commissioned in 1989 about twenty five years ago. In addition, Japan is the fourth biggest oil refiner in the world with 25 operating refineries as at 2012. Japan is refining 4.25 Mbd which is equivalent to about 4.6% of the world's total refinery capacity (Petroleum Association of Japan 2013). Theoretically, countries can deregulate their downstream oil sector base on many criterions among which is petroleum resources endowment and refining capacity¹⁰. Japan refines all the petroleum products it requires for domestic consumption, while Nigeria imports most of the refined petroleum products for

¹⁰ Different criteria for deregulating downstream oil sector or introduction of subsidy into the sector was discussed in detail in chapter three of this thesis.

domestic consumption. Therefore, Nigeria's deregulation is import dependent which is inherently inflationary. While Japan's deregulation is based on what is termed as "Domestic Petroleum Refining System" a system which makes the country self-sufficient in terms of domestic supply of petroleum products and reduces the impact of external market shocks on the domestic supply and prices.

The result of variance decomposition shows that deregulation is the source of variation in inflation accounting for over 6% in the tenth quarter, 12% in the fifteenth quarter and 13% in the twenty quarter under the study period 1980q1 – 2012q4. This indicates that subsidy withdrawal at the downstream oil market in Nigeria is inflationary, because increase in the price of petroleum indirectly affects all the other sectors in the economy through its direct effect on transport and manufacturing sectors.

The result of the granger causality shows unidirectional relationship between changes in domestic petroleum price and inflation which means that changes in petroleum price granger causes inflation but inflation does not granger causes changes in domestic petroleum price. This shows that changes in petroleum prices (LPEP) is not as a result of increased productivity in the country but is rather a result of an exogenous factor which in this case is the subsidy withdrawal policy which makes prices to go up in the economy. This positive relationship between change in petroleum price and inflation has provided answers to

the research question RQ: 3.2 which read thus; what will be the effect of oil price change on inflation within the context of Nigerian economy? It also answers research question RQ: 2.2 which read thus; will subsidy removal due to deregulation bring about inflation into the economy?

What is desirable is a unidirectional causality where inflation granger causes changes in petroleum prices and not vice versa. In a situation where inflation granger causes changes in petroleum prices the interpretation would have been that there is high productivity in the economy which resulted in high demand of inputs including petroleum products as a result of which prices went up. But under this scenario, the rise in inflation is not as a result of increased economic activities and therefore has negative effect on the economy as a whole.

The justification for the above assertion is that all economic sectors in Nigeria have a direct or indirect linkage with the transportation sector. Once the prices of petroleum products went up, transportation becomes more expensive as transporters mark-up their fares to recover the high cost of fuel.

Besides, because of the increase in transportation fares, nearly all commodities prices go up. This is what leads to undesirable inflationary pressures in the economy. As mentioned earlier on, all Nigerian economic sectors are dependent on the transport sector which is in turn dependent on petroleum products (Adetola, A., Goulding, J., and Liyanage, C. 2011). It is worthy to note that increases in petroleum price affects even those

who have no vehicles. It has become a common denominator upon which the prices of almost everything in Nigeria are measured.

As mentioned earlier in chapter two, the combined production capacity of all the four petroleum refineries in Nigeria is to refine 445,000.00 barrels of crude oil per day when operating at full capacity. However, as at 2012 the refineries were only operating at 60% capacity (Budget Office 2012). In a country which consumes an average of 30 million litres of petroleum per day, the total production by the domestic refineries is highly inadequate. Therefore, as against the situation in Japan, the deregulation in Nigeria is a deregulation based on imported refined products. It is worth emphasizing that a deregulation policy that is based on importation of refined products is inherently inflationary and destabilizing for the domestic economy. This is because massive importation necessarily puts pressure on the exchange rate which makes the local currency weak in the face of international currencies and therefore makes importation very expensive.

This is a bad scenario for a country like Nigeria where the manufacturing sector depends on imported raw materials, imported machineries, imported tools and imported spare parts to operate.

Therefore, a subsidy withdrawal policy which leads to higher prices of petroleum products in an economy with inadequate electric power supply where according to Bazilian and Onyeji (2012) industrial sector rely heavily on fueled generators to operate, makes cost of production

very high which in turn makes the prices of the products they produce to be very high and therefore attracts low demand which results into low profits and low return on investments. It also makes their products less competitive in relation to imported ones. This has the potential effect of destroying the industrial base of the country and worsening the unemployment situation. This is because manufacturers respond to high cost of production and low demand of their products by cutting down production and laying off of their workers as a means of saving cost and survival under harsh business environment.

This has made void of the government's assertions that a deregulation policy will attract new investors, sellers, buyers, increase the competition and thereby promote higher productivity and lowering general prices of goods and services over time in the economy. On the contrary Okafor, (2008) in Bazilian and Onaji (2012) observed that deregulation in a country with ailing power sector results into oil price hike which in turn results into increased aggregate expenditure on gasoline to fuel factories generators which leads to high cost of production, shrinking domestic demand and leads to reduction of sales for businesses.

Turning to Gross Domestic Product (GDP), the result of impulse response function indicates that subsidy withdrawal has positive effect on GDP (fig. 5.3). With this result we can reject the null hypothesis 1.0: which read thus; there is no relationship between subsidy withdrawal at

the downstream oil-sector and the economic growth of Nigeria and confirm the alternate hypothesis 1.A: which read thus; there is a relationship between subsidy withdrawal at the downstream oil sector and economic growth of Nigeria. It also makes us confirms alternate hypothesis 7.A: which read thus; there is a relationship between subsidy withdrawal at the downstream oil sector and GDP. This makes us reject the null hypothesis 7.0: which reads thus; there is no relationship between subsidy withdrawal at the downstream oil sector and GDP. The result also disprove research question RQ: 2.3 which reads thus; whether deregulation of the downstream oil sector will lead to higher cost of production and therefore affects GDP negatively.

Similarly, the result of variance decomposition has shown that changes in domestic oil prices through deregulation is a significant source of variation in GDP in Nigeria, accounting for over 10% in the fifth quarter, rising to over 14% in the tenth quarter and then declining to approximately 11% and 8% in the 15th and 20th quarters respectively. This result answers the research question 3.5 which reads thus; in what ways will the domestic oil price shock affects the Nigeria's economy.

The result of granger causality test indicates unidirectional causality between LPEP and LGDP, which shows that LPEP granger causes LGDP but LGDP do not granger causes LPEP. This result is interesting because it is instructive to note that the test result indicates that LPEP granger causes LGDP because we fail to reject the null of no

causation but LGDP do not granger cause LPEP because we reject the null of no causation. In other words the result means that the growth in GDP is as a result of changes in petroleum price, but the increase in petroleum prices is not as a result of increased productivity. This means that increase in petroleum prices was not caused by increased in demand which indicates increase in productivity but by the government policy of deregulation of downstream oil sector.

This has shown that even though the change in LPEP has positive effect on LGDP as noted in the results of the impulse response function (fig. 5.3) above, yet the increase in GDP as far as the result of granger causality test indicates it is not as a result of increased productivity within the economy but rather as a result of increased income accrued to the Nigerian government in the form of withheld revenue that could have been spent on subsidy which is now retained by government as a result of subsidy withdrawal. As noted in chapter three, theoretically GDP can be affected by changes in oil prices either via its demand side effect or via its supply side effect. The demand side effect is the change and or increased in oil prices due to high demand which is also as a result of increased economic activities and productivity within the economy. The supply side effect on the other hand is caused by exogenous factors such as the activities of cartel or government policy that have no direct bearing with increased productivity in the economy.

From the above it can be understood that demand side effect of changes in oil prices is desirable because it is a result of increased economic activity while the supply side effect is not a good indication because it could retard economic growth in the long run as argued by Hamilton (1983) and Paul C. *et al* (2012). The supply side effect however, is what the subsidy withdrawal at the downstream oil sector brought into the Nigeria's economy which is a negative effect in the actual sense. This is evident from the result of short-run economy-wide effect of 10% increase in petroleum prices using data from Nigerian Institute of Social and Economic Research 2012.

Table 5-7 Short Run Effect of 10% Increase in Domestic Petroleum Price on Various Sectors of the Economy in Nigeria

Serial Number	SECTOR	EFFECT ON SECTORAL INPUT (% CHANGE)	EFFECT ON SECTORAL OUTPUT (% CHANGE)
1.	Agriculture	0.20	-4.35
2.	Livestock	0.00	-1.69
3.	Forestry	0.60	-4.07
4.	Fishing	0.60	-3.90
5.	Petroleum	4.02	-3.37
6.	Other mining	1.80	-3.33
7.	Drink Bev. And Tobacco	0.70	-3.84
8.	Textile	0.60	-3.35
9.	Foot wear	0.90	-6.09
10.	Wood	0.60	-7.26

11.	Paper	0.70	-4.61
12.	Pmg. and chemical	0.80	-4.39
13.	Refineries	10.00	-5.72
14.	Rubber and plastic	0.20	-4.39
15.	Iron and steel	2.10	-6.45
16.	Fabrication metal	1.70	-5.98
17.	Vehicle assembly	0.60	2.95
18.	Other manufacturing	1.20	-2.81
19.	Utilities	3.30	-4.83
20.	Building and construction	0.50	-1.87
21.	Transportation	6.20	-7.03
22.	Communication	0.90	-1.05
23.	Distribution trade	1.70	-3.44
24.	Hotel and restaurant	0.30	-6.67
25.	Finance and insurance	1.30	-6.67
26.	Business services	0.60	-4.70
27.	Housing	0.60	-1.89
28.	Commercial services	0.30	-4.03

Source: Authors' computation using data from Nigerian Institute of Social and Economic Research (2012).

The above data shows that increase in petroleum prices has profound economy wide effects as shown on table 5.7 above. Indeed price subsidy withdrawals based on imported products without local supply from domestic refineries have a negative impact on various sectors of the economy.

As an illustration, the table 5.7 indicates that if there is an increase of 10% in the pump prices of petroleum products, there will be an increase of 0.20% cost in agricultural sector with -4.35% decreases in output. There will also be a decrease of -1.69% in livestock output. The forestry sector will have a cost rise of 0.60% with a decrease in output to the tune of -4.07%. Fishing will have a rise in cost by 0.60% and a decline in output by -3.90%. The data also reveals that petroleum sector will record a 4.02% rise in cost and -3.37% declines in output. The same goes with other mining sector which will receive a cost rise of 1.80%, with output decline of -3.33%. Drinks, beverages and tobacco sector will have cost increase of 0.70%, and output decline of -3.84%. Textile sector will record 0.60% increase and a decrease in output of -3.35%. Foot wear will have 0.90% cost increase and -6.09% decreases in output. A further look at the data also shows a 6.2% increased cost in transportation sector, with -7.03% decreases in output and utility sector 3% increase in cost with -4.83% decreases in output etc. Conclusively, it shows that there will be significant decreases in output in all sectors with transportation and wood suffering the severer decline.

Going by the above therefore, the goal of introducing a subsidy withdrawal policy is far from being realistic. In chapter three of this thesis we have reviewed the position of the Federal Government of Nigeria where it argues that among the advantages of a deregulation policy is that it will expose the domestic oil market to the prices obtained in the international market which will bring efficiency in the downstream oil

market itself and will also bring efficiency in the energy usage in all the sectors of the economy which would stimulate growth and development in the economy. Unfortunately however, the results of this study indicate that none of the three types of economic inefficiencies were abated by the introduction of deregulation policy. For example, it was posited in the literature that there are three types of economic inefficiencies which include; technical and or managerial inefficiency, scale inefficiency and price or allocation inefficiency. A situation as the one reported in table 5.7 above negates every definition of efficiency, because a situation that raises the cost of input and reduces the quantity of output is everything but efficiency. As mentioned in the literature review chapter three, technical inefficiency is a situation where the actual inputs exceeds the minimum required to produce the scale efficient output with cost minimising input ratio. While, scale inefficiency is a situation where the actual output is less than the cost minimising output, furthermore, price or allocation inefficiency is a condition under which actual input ratio differs from the cost minimizing input ratio. All these were not achieved under the Nigeria's downstream oil sector deregulation strategy.

This may not be unconnected with the fact that the federal government of Nigeria has not taken a critical look at the country's macroeconomic condition as an oil producing state prior to introduction of deregulation policy. As postulated in chapter three where taxonomy of downstream oil sector deregulation was carried out, countries can deregulate their downstream oil sector or introduce subsidy based on

their resource endowment and refining capacity (Bacon and Kojima 2006). Under this situation scholars have classified countries into three categories, depending on their petroleum resources endowment;

1. Countries without refining capacity, which is further subdivided into two; (i) oil producing and (ii) non-oil producing
2. Oil producing countries with refining capacity
3. Non-Oil producing countries with refining capacity

According to the above classification Nigeria can be either in group 1(i) or group 2 above, it can on the other hand be in both groups. This means Nigeria is an oil producing country with refining capacity on one hand because it refines part of the products consumed in the country using its four refineries. On the other hand Nigeria can be said to be an oil producing country without refining capacity because it cannot refine enough products to satisfy its domestic needs. Therefore, for the purpose of this analysis we are going to consider Nigeria as an oil producing country without refining capacity because it imports a substantial part of the refined petroleum consumed locally.

Under this situation, using Bacon and Kojima (2006) frame work the country has two options either to deregulate the sector and allow market forces to determine the prices of petroleum products or introduce a subsidy. If the country decides to deregulate as is the case with Nigeria, domestic oil prices will be arrived at by adding the cost of imported product, whole sellers and retailer's margin plus specific and value added taxes. This can be expressed as follows:

$$P_R = (P_i + M + T) \times (1 + \tau) \quad (\text{Equation 5.1})$$

Where:

P_R = retail price per unit of a product

P_i = per unit price of an imported product

M = Domestic marketers margin (wholesale, retail, storage and internal transport)

T = specific tax on one unit of product sold

τ = tax rate on one unit value of final sale

If the government chooses the second option and desires to bring down the price at retail level it can achieve that in four different ways.

- Pay a subsidy to importers in order to reduce the effective cost of imported product (P_i)
- Pay a subsidy to wholesalers or retailers in order to reduce the internal marketers margin (M)
- Reduce the specific (T) or value added (τ) tax rates
- Reduce the final pump price (P_R) by paying a subsidy to retailers

Second option was the situation in Nigeria from 1973 when a subsidy was introduced in the downstream sector of the oil industry, where distribution subsidies were paid to middle men through Petroleum Equalisation Fund and other form of subsidies were paid through the

Nigerian National Petroleum Corporation (NNPC), and no taxes were imposed.

That has made possible the development of agro-allied and import substitution industries. It has also led to the development of a large number of small and medium scale enterprises which became one of the largest employers of labour in the country (Bazilian and Onyeji, 2012). Clearly the country experienced growth and a low level of unemployment rate during that period.

With the introduction of a deregulation policy however, the cost of production became high and as of May 2007 about 30% of all manufacturing industries in the country had shut down, about 60% were operating below their installed capacity and only about 10% were operating at a sustainable level (Bazilian and Onyeji, 2012).

From the above, it can be clearly seen that the Nigeria's federal government decision to deregulate the downstream oil sector in line with the classical theory of free market, where forces of demand and supply sets the prices of goods and services in the economy, has not brought the desired results of allocating resources for the production and consumptions of goods and services to meet the need of all sectors in the economy.

The supposed optimisation assumption in the allocation of resources and profit maximisation through perfect competition associated with free market economy may not be applicable to all situations. What the promulgators of deregulation policy in the Nigerian government failed

to understand is that the free market theory and its optimisation assumptions depends on a series of conditions, assumptions and circumstances which according to a report of the World Energy Council (2001 p. 1) "are more stringent than those likely to exist in the real world, and especially in developing countries". In Nigeria the question of inefficiencies associated with imperfect market mechanisms, the existence of market failures and the peculiarity of the oil sector where the number of producers and or suppliers is small need to be addressed. This is because for a perfect competition market to exist there must be large number of buyers and sellers in the market. Otherwise even the deregulation policy itself instead of leading to competition in the sector, it will only succeed in creating monopoly and oligopoly with all their attendant negative consequences on the other sectors of the economy.

For the above reasons therefore, deregulating the downstream oil sector along the line of classical free market theory of price mechanism may not redress the problem of the downstream oil sector in Nigeria. In its report entitled 'Pricing Energy in Developing Countries' the World Energy Council shows the relevance of subsidising energy in the developing countries where it states thus;

"The failure of the price system to allocate resources efficiently, in all situations and for all actors, is of interest for various reasons. It implies that market prices do not necessarily reflect marginal social benefits or costs, and that market profitability does not necessarily reflect net social benefits and costs. Also, the failure of market to allocate resources efficiently provides reasons to consider supplementary mechanisms, intervention or corrective devices to induce market to function more efficiently. The two best known and commonly used intervention devices are taxes and subsidies, which consequently makes them of major

interest in the context of energy markets, where market reform must go hand in hand with appropriate regulation”

(A report of the World Energy Council 2001 pp 1-2).

The Report continues to suggest that;

“‘Pure’ economic efficiency is not the only criterion that may be used for utility pricing, and many policy makers and prominent economists have argued that equity or income distribution ought to be taken into consideration as well” (op cite 2001).

In the case of Nigeria the survival of small and medium scale enterprises and indeed the whole manufacturing sector and the protection of jobs ought to be taken into consideration in the pricing of oil. This is because, contrary to the classical theory of market efficiency and the assumption that any economically desirable outcome can be achieved via market forces provided the market condition is appropriate. However, according to a report of the World Energy Council (2001) such an appropriate market condition clearly does not exist in most developing countries. At this juncture the appropriate question to ask is how does a country with such market imperfection make progress towards achieving the goal of economic growth, increased productivity, generate employment, and achieve prosperity for all its people and ultimate development? The answer to this as suggested by a report of World Energy Council (2001p.3) is simple where it states thus; “transfer payments are one technique, but obviously subsidies are a very appealing and easy method to apply”.

Another point, worthy of note is that, developing countries such as Nigeria need to look at their peculiarities before embarking on any policy.

For example, a country like Nigeria with weak institutions and inadequate infrastructure cannot copy a policy just because that policy has worked in the developed countries. This is due to the fact that in developed countries the primary challenge of market reform is to bring prices down to the competitive cost of service. However, in developing countries like Nigeria, due to inadequate infrastructure and high cost of fuelling generators as a result of deregulation policy and inadequate power supply, the primary challenge is to set prices high enough in order to cover the cost of production. This creates a situation where the prices of the goods produced by the domestic industries and the services they provide become unaffordable for many people in the country. Law of demand postulates a negative relationship between price and quantity demanded. That is the higher the price the lower will be the quantity demanded. This condition usually results into economic recession and stagnation. It could also ignite a vicious circle of recession where low demand leads to low profit, which in turn leads to low investment and results into low productivity and loss of jobs. This therefore makes it imperative for the government to intervene in the economy alongside the market forces as advocated by Keynes and in line with the doctrine of mixed economy. This answers research question RQ 3.1 which states thus: Which economic theory will best suit Nigerian economy in relation to the deregulation of the downstream oil sector?

With regards to the unemployment rate, the result of impulse response function shows that changes in petroleum prices has a negative

effect on unemployment rate in the beginning of the observation period up to the fourth quarter. It became positive in the fifth quarter which continues up to the end of the twentieth quarter period. This means that the shock in prices of petroleum has a positive effect on unemployment rate in the economy. The result answered the research question RQ: 3.3 which read thus; what will be the short run and long run effect of deregulation on Nigeria's labour market?

Furthermore, the result of the impulse response function on the effect of the domestic oil price increase on unemployment rate shows persisting positive effect on unemployment. In other words it indicates higher unemployment rate in the economy and this answers research question RQ: 3.4 rose earlier which reads thus; will change in petroleum prices in Nigeria due to deregulation have indirect negative effect on industrial production due to high cost of production and lead to a loss of jobs and negatively affect employment? The result has also answered a similar research question raised in chapter two which reads thus; will subsidy removal via deregulation increase the prices of petroleum products and thereby increase the cost of production which will make producers cut down production and increase unemployment in the economy?

Another significant feature of the result of the impulse response function on unemployment rate is that, going by the result we cannot reject the null hypothesis 9.0: rose in chapter three which read thus;

there is no relationship between domestic oil prices and employment. Therefore, the result could not provide strong evidence to support the alternate hypothesis 9.A which states that; there is a relationship between domestic oil prices and employment. This is because even though the result of the test indicates that the shock has brought about increased employment in the beginning of the observation period, the results reveals increased unemployment in the later period of the observation. This is consistent with the findings of Papapetrou, (2001) who examines the oil price shock, stock market, economic activity and employment in Greece. She employed a multivariate vector-auto regression model to find the dynamic relationship between real oil price, interest rate, industrial production and employment rate. Papapetrou's findings reveal that oil price shock has negative effect on industrial production and employment. Conversely this is inconsistent with the findings of Keane and Prasad (1996) who shows positive result of oil price shock on unemployment in the short run which became negative in the long run. Nevertheless, it should be noted that Kean and Prasad conducted their studies on the economy of United States of America where the economy is developed. However, the economy of Nigeria, the focus of this research is developing and hence the findings became opposite. Little wonder therefore, that while the price shock results into increased employment in United States of America in the long run it results into increased unemployment in Nigeria. This has also vindicated the assertion of Carruth, *et al* (1998) and Davies and Haltiwanger (2001) who shows that effect of oil price

increase on the labour market can differ according to considered horizon either long run or short run. It could also depend on the level of economic development of the country under study.

The initial negative effect of the domestic oil price increase on unemployment in Nigeria can be explained by the fact that every period of domestic petroleum price increase is followed by a boost in black market activities which provides seasonal (ad-hoc) employment to the citizens especially the youth who constitute the larger body of the unemployed in the country. Therefore, in the later period when the prices normalised the activities of the black market wanes and the rate of unemployment rises. This has confirmed the views expressed by labour unions and other civil society organisations in Nigeria who argues that changes in the domestic petroleum prices as a result of subsidy withdrawal will lead to increased unemployment in the country.

The result of a variance decomposition test on unemployment rate shows that increase in domestic petroleum prices in Nigeria has significant influence on unemployment rate. The result as shown in table 5.5 indicates that 7% changes in unemployment rate in the first quarter of the observation period is as a result of increase in domestic petroleum prices, it rose to more than 11% in the tenth quarter, to more than 23% and 31% in the fifteenth and twentieth quarters respectively.

This has buttressed the results of the impulse response function analysed above. In view of this result therefore, we reject the null

hypothesis 3.0: rose in chapter two which states that; there is no significant relationship between increase in petroleum prices and unemployment rate in Nigeria and accept the alternate hypothesis 3.A: which states that; there is a significant relationship between increase in domestic petroleum prices and unemployment rate in Nigeria.

A closer look at the results of Granger causality test on unemployment rate reveals that neither change in LPEP Granger cause UNEMPRTSIS nor does changes in UNEMPRTSIS Granger causes LPEP. This shows that the two variables are independent of one another. It is however noteworthy that the mere fact that there is no granger causality among these two variables does not mean no relationship at all because; "Granger-causality really means only a correlation between the current value of one variable and the past values of others; it does not mean that movements of one variable cause movements of another" (Brooks 2011 p 298).

Added to that, it is worthy to have a second look at the impulse response function which shows negative effect of subsidy withdrawal on unemployment in the beginning of the observation period which became positive at the later stage. This shows that in the long run subsidy withdrawal policy in Nigeria results into increased unemployment. As indicated above, subsidy withdrawal policy in Nigeria is based on imported products, which means Nigeria as an oil producing country cannot refine enough petroleum products for its domestic consumption.

It has to rely on imported products, thereby exporting employment and importing unemployment, because when Nigeria import refined products, the refineries in exporting countries will produce more and employ more people and resources while Nigerians remain unemployed due to the failure to expand the existing refineries and build new ones in order to boost products supply and generate employment in the process.

Furthermore, high cost of imported products and the high cost of domestically refined products as a result of subsidy withdrawal policy results into higher cost of production to the domestic industries that depend on fuelled generators because of near absence of electricity supply in the country (Bazilian and Onyeji 2012). This situation forces them to scale down production and reduce their workforce and in some cases fold up completely, as is the case with textiles industries. According to 'Frontier Market Intelligence' an online tabloid of 'Trade Invest Nigeria' accessed on (22/06/2014)

"The textile industry of Nigeria used to be one of the biggest in Africa and one of the largest employers in the country. The sector has however shrunk dramatically and many companies have closed shop with the smuggling of cheap foreign textile materials and clothing into the Nigerian market being one of the main reasons for this collapse. Prices of local materials have also become much higher than its imported counterparts due to increased production costs".

The above quotation shows how subsidy withdrawal at the downstream oil market results into high cost of production, as a result of high oil prices to fuel machines and generators which in turn leads to shrinking of some textiles companies and the closing of many others. This has resulted in the laying off of workers to reduce cost in the case of the former and a colossal loss of jobs in the case of the latter. The above scenario with regards to textiles industry is just an example of one sector, the same is the case with almost all the other economic sectors in the country.

Turning to minimum wage, the result of the Impulse response function reveals that increase in domestic petroleum prices has a negative effect on the minimum wages in the early quarters of the observation up to the tenth quarter when it becomes positive and persisted up to the twentieth quarter study period, which indicates positive effect in the later stage. Going by the results observed we reject the null Hypothesis 4.0: which states that; there is no relationship between subsidy withdrawal at the downstream oil sector and minimum wage in the Nigerian economy. We in turn accept the alternate Hypothesis 4.A: which states that; there is a relationship between subsidy withdrawal at the downstream oil sector and minimum wage in the Nigerian economy. In the same vain, the result makes us reject the null hypothesis 8.0 raised in the chapter three which states that; There is no relationship between subsidy withdrawal at the downstream oil sector and minimum wage. We in turn accept the alternate hypothesis 8.A:

which states thus; there is a relationship between subsidy withdrawal at the downstream oil sector and minimum wage.

In view of the above it can be concluded that increase in LPEP has a short term negative effect on MINWAG which becomes positive in the long run. The finding on long run effect is inconsistent with the concept of inflation effect on fixed income. Theoretically inflation affects fixed income earners negatively because it erodes the real value of money paid to them. However this can be explained by the fact that every increase in the prices of petroleum products in Nigeria is followed by increased in wages through the review of minimum wage act. Therefore, the short period negative effect represent the period before wage increase while the later stage effect represent the period that follows the wage increase. However, this finding is consistent with the findings of Clarke and Edward (1998). Using a simplified general equilibrium model on Japan they observes that downstream oil sector deregulation policy leads to a rise of about 0.70 percent in real wage and 0.13 percent rise in GDP.

When we focus on the results of variance decomposition on MINWAG it shows that changes in domestic petroleum prices does not have much effect on minimum wage which indicates 0.0% in the first quarter of the observation period and rose to a dismal 4.6% in the twentieth quarter study period. This could be as a result of wage increases after each rise in the domestic oil price as explained above.

In the same way the result of Granger causality test indicates that neither does LPEP granger-causes LMINWAG nor does LMINWAG Granger-causes LPEP. Therefore, there is no Granger-causality either way.

5.7 CONCLUSION

This chapter assessed the effect of subsidy withdrawal in the downstream oil sector on the economic growth of Nigeria using quarterly time series data from 1980q1 to 2012q4. The main focus is on the dynamic relationship between an increase in oil prices as a result of subsidy withdrawal at the downstream oil sector in Nigeria and four macroeconomic variables namely; GDP, INF, UNEMPSIS and MINWAG. The main instrument of the data analyses is the Vector Auto Regression Model techniques, using; Impulse Response Function, Variance decomposition and Granger causality. Added to that, Augmented Dickey Fuller (ADF) and Philip Perron (PP) techniques were employed to check the time series characteristics of the data, while Johansen cointegration test using both Trace and Maximum Eigen value was carried out to test the long run relationship of the variables.

The ADF and PP tests indicate that INF is stationary at its level, while the remaining variables which are PEP, GDP, UNEMPRISIS and MINWAG were non stationary at their level but are stationary at first difference. Furthermore the Johansen cointegration test was carried out to test for long run relationship among the variables employing Trace Statistics and Maximum Eigen Value and the result of both the Trace and Maximum Eigen value shows that there is no cointegration among the variables.

The result of the Impulse response function shows positive impact of deregulation on GDP and INF, while the impact was negative in the short run on MINWAG and UNEMPRT it also became positive in the long run.

The result of Variance decomposition indicates that change in LPEP is a significant source of variation in GDP, INF and UNEMPRTSIS but is not significant in the variation of MINWAG.

The result of Granger Causality indicates unidirectional causality running from LPEP to LGDP and from INF to LPEP, while there is no indication of granger causality either way in the case of LPEP and UNEMRTSIS and LPEP and MINWAG.

Overall it can be concluded that there is a strong relationship between variation in domestic oil price and major macro-economic variables in Nigeria, and variation in domestic oil price is a strong source of variation in the economic growth of Nigeria.

CHAPTER SIX

SUMMARY

AND

CONCLUSION

6.1 INTRODUCTION

In this chapter the summary of the thesis and conclusions based on the research findings are presented. It also presents the contribution of this research to the body of knowledge and highlights the limitations of the study and suggests areas for further research.

6.2 SUMMARY OF THE STUDY

This study was undertaken to determine the effect of subsidy withdrawal at the downstream sector of the Nigerian oil industry on the economic growth of the country. Literature shows that there was long standing decay in the Nigerian's oil sector (see for example Ribadu 2012, and Ariweriokuma S. 2009) especially the downstream sector which was characterised by inadequate refining capacity due to small number of refineries, which are operating below their installed capacities. The refineries were operating far below their installed capacity because of skipping the routine turn-around maintenance due to poor funding of refineries and gradual decline in infrastructural investment in the sector. There was also the prevalence of pipeline vandalism and product smuggling (FGN 2005). These problems coupled with rapid increase in the demand for petroleum products resulted in product scarcity which manifest in long queues of vehicles at filling stations and black marketing in the country.

In order to address the problems mentioned above, the federal government of Nigeria resorted to a massive importation of refined

petroleum products. However, products importation came with new challenges; firstly is the huge amount of foreign currency required in financing the importation and secondly the large scale fraud associated with financing the importation of refined products (Ribadu 2012) and (Aliyu SUR. and Elijah AO. 2008). This added to the argument that the subsidy in the sector does not benefit the targeted beneficiaries; that is the low income in the society, culminated into the decision to withdraw subsidy in the sector.

However, the labour unions and other civil society organisations were of the view that subsidy withdrawal at the downstream oil sector under the prevailing condition in Nigeria where there is inadequate power supply and where manufacturing sector largely depends on fuel generators to run their machineries (Bazilian M. and Onyeji I. 2012) will bring negative effect on output, employment and wages. It will also trigger inflation into the economy.

In view of the above two conflicting arguments this empirical study was conducted to find the effect of subsidy withdrawal at the downstream oil sector on the economic growth of Nigeria. To achieve the aim of the study, four major macroeconomic variables which are; Gross Domestic Product (GDP), Inflation, Unemployment rate and Minimum wage were tested against the change in domestic petroleum prices (PEP). To find the effect of subsidy withdrawal at the downstream

oil sector on the economic growth of Nigeria, the quarterly time series data was used from 1980 q1 to 2012q4.

The methodology employed for the study is Unrestricted Vector Autoregressive Model (VAR), where the resultant Impulse Response Function, Variance Decomposition and Granger Causality tests are conducted and analysed. Prior to running the VAR, some diagnostic tests were carried out on the time series properties of the data to check for the problem of unit root using Augmented Dickey Fuller and Philip Peron tests. Furthermore, cointegration test was also conducted to check the long run relationship among the variables using Johansen cointegration test technique, which is based on Maximum Eigen value and Trace Statistics. The lag length criteria used was five lags as suggested by: sequential modified LR test statistic (each test at 5% level) (LR), Final prediction error (FPE) and Akaike information criterion (AIC)¹¹.

6.3 REVISITING THE RESEARCH OBJECTIVES

In order to achieve the aim of this study, the researcher considers six objectives of which there is one main objective and five other specific objectives.

1. The main objective is to look into the dynamic effects of subsidy withdrawal at the downstream oil sector on the economic growth of Nigeria which was achieved through four specific objectives.

¹¹ Appendix 7 contains the full details of lag length selection criteria.

The specific objectives are:

2. To determine the effect of subsidy withdrawal at the downstream oil sector on GDP.
3. To evaluate the effect of subsidy withdrawal at the downstream oil sector on Inflation.
4. To investigate the effect of subsidy withdrawal at the downstream oil sector on Minimum wage.
5. To analyse the effect of subsidy withdrawal at the downstream oil sector on Unemployment rate.

Other specific objective of the study is:

6. To suggest possible policy measures and actions as medium and long-term solutions to the lingering macroeconomic crisis caused by the subsidy withdrawal at the downstream oil-sector.

The main research objective and the other specific objectives were achieved as follows:

1. RO1: *To look into the dynamic effects of deregulation of downstream oil sector on the economic growth of Nigeria.*

The main objective was achieved by analysing quarterly data from 1980q1 to 2012q4 on four major macroeconomic variables in the country. This was successfully carried out using unrestricted Vector Auto Regressive Model (VAR). The model is a system regression used where there is more than one dependent variable. One of the advantages of VAR is its ability to capture the relationship between different variables.

As there are more than one dependent variables in this study, VAR was employed using Generalised Impulse Response, Variance Decomposition and Granger Causality tests to analyse the dynamic relationship between the macroeconomic variables and their response to changes in domestic petroleum prices in Nigeria. The result of the tests suggests that an increase in domestic petroleum prices due to the subsidy withdrawal at the downstream oil sector has a negative effect on the overall economic growth of Nigeria. Although the result of the impulse response function indicates positive relationship between LPEP and LGDP, a critical look at the Granger Causality test result shows that the positive effect is not as a result of increased productivity but rather a result of expansion in government spending. It is therefore concluded that there is negative relationship between subsidy withdrawal at the downstream oil sector and overall economic growth of Nigeria.

To test the robustness of the above findings data from Nigerian Institute of Social and Economic Research (NISER 2012) was used to test for short run economy-wide effect of 10% increase in petroleum prices in addition to the four main variables that were considered in this study. The result indicates that subsidy withdrawal at the downstream oil sector brings negative effect on the economy. This is clear from the observed percentage change on sectorial input versus percentage change in sectorial output in Nigeria. The results of deregulation on inflation have also buttressed this. Furthermore, the granger causality results on GDP which shows that the rise in GDP under the subsidy withdrawal regime is

not as a result of increased economic activity but rather a result of exogenous factor all pointed to the negative economy-wide effect of subsidy withdrawal policy in Nigeria. The same is also the case when results of subsidy withdrawal and the unemployment rate are considered. This therefore shows that this research objective is achieved.

Each of the specific objectives has been met as follows:

2. RO 2: *To determine the effect of subsidy withdrawal at the downstream oil sector on GDP.*

This objective was achieved by analysing quarterly time series data collected on GDP from 1980q1 to 2012q4. The analyses were carried out using unrestricted VAR with its resultant Impulse Response Function, Variance Decomposition and Granger Causality tests.

The result of the impulse response function indicates positive response of GDP to rise in domestic petroleum prices due to the subsidy withdrawal at the downstream oil sector in Nigeria. The positive response is statistically significant between the 4th and 8th quarter. The statistical significance observed in these quarters can be explained by the fact that subsidy withdrawal brings extra income to government in the form of retained revenue which would have been spent in subsidy payment. The government in turn injects that revenue into the economy by way of increased spending. However, that increased spending is injected slowly and is absorbed slowly into the economy. Therefore, the first three quarters represent the window period when the increased spending was

yet to make significant impact in the economy and the remaining periods after the 8th quarter, this represents the period when the impact was slowly dying down as the economy adjusts to the increase.

The result of Variance decomposition shows that changes in domestic petroleum prices in Nigeria is a significant source of variation for GDP. It explains more than 10% of variation in GDP in the 5th quarter, more than 14% by the tenth quarter, and then declining to more than 7% in the 20th quarter. This means that there is strong relationship between subsidy withdrawal at the downstream oil sector and GDP growth in Nigeria.

Granger causality test indicates that changes in domestic petroleum prices as a result of subsidy withdrawal at the downstream oil sector granger causes GDP while changes in GDP does not granger causes changes in domestic petroleum prices. This means that the increase in GDP is not as a result of increased productivity in the economy but rather a result of an exogenous factor which in this case is subsidy withdrawal at the downstream oil sector.¹²

It is therefore concluded that notwithstanding the positive response of GDP to change in petroleum prices there is no real improvement in productivity in the economy.

3. RO3: *Evaluate the effect of subsidy withdrawal at the downstream oil sector on Inflation.*

¹² These results were interpreted in detail and the implications of the results were fully discussed in chapter five of this thesis.

This objective was also achieved by analysing the quarterly time series data from 1980q1 to 2012q4 on inflation in Nigeria. The method of measurement was the use of unrestricted VAR employing Impulse Response Function, Variance Decomposition and Granger Causality tests. The result of Impulse response function suggests that in the short run inflation responds positively to the changes in domestic petroleum price which becomes negative in the long run.

The result of Variance Decomposition indicates that changes in petroleum price due to subsidy withdrawal at the downstream oil sector are a significant source of variation in inflation in Nigeria. This means that there is strong relationship between deregulation of downstream oil sector and inflation in Nigeria.

The result of Granger causality test suggests that changes in domestic petroleum price due to the subsidy withdrawal at the downstream oil sector Granger causes inflation in Nigeria. However, inflation does not Granger causes changes in domestic petroleum price in Nigeria. The import of this result is that increase of petroleum prices was not as a result of inflation in the economy. However, the rise in inflation is as a result of an increase in the prices of petroleum products. It is therefore concluded that subsidy withdrawal at the downstream oil sector results into a rise in inflation in Nigeria.

4. RO4: *Investigate the effect of subsidy withdrawal at the downstream oil sector on Minimum wage.*

As was the case in analysing the other variables, quarterly time series data from 1980q1 to 2012q4 on minimum wages in Nigeria was collected and analysed. The analysis was done using unrestricted VAR and the Impulse Response Function, Variance Decomposition and Granger Causality tests were conducted.

The result of the Impulse Response Function shows negative response of minimum wage in Nigeria to the changes in domestic petroleum prices in the early stage of the observation period which becomes positive in the later stage.

The result of Variance Decomposition indicates that changes in domestic petroleum prices as a result of subsidy withdrawal at the downstream oil sector have dismal effect on minimum wage in Nigeria.

Result of Granger Causality test suggests that changes in domestic petroleum prices as a result of deregulation of the downstream oil sector does not Granger cause minimum wage nor does minimum wage Granger causes changes in domestic petroleum prices.

Based on the above results it is concluded that subsidy withdrawal at the downstream oil sector has dismal effects on the minimum wage in Nigeria in the long run even though it affects it in the short run. The implication of these results is that the policy of subsidy withdrawal in Nigeria has no long term significant effect on minimum wage. This is because from the literature reviewed and the data obtained on Minimum wage in Nigeria, it was discovered that whenever the government tinkers with the price of petroleum in line with deregulation policy, it is always

followed by increases in wages and an upward review of minimum wage. This is as a result of industrial actions embarked by trade unions to protect their members whenever petroleum prices are reviewed in line with deregulation policy. This therefore shows that the above research objective was realised.

5. RO5: *Analyse the effect of subsidy withdrawal at the downstream oil sector on Unemployment rate.*

To achieve this objective data on unemployment rate was collected and analysed using an unrestricted VAR employing Impulse Response Function, Variance Decomposition and Granger Causality tests.

The result of Impulse Response Function reveals that in the short run unemployment rate responds negatively to the changes in petroleum prices which become positive in the long run. This means that in the short run changes in domestic petroleum prices results in lowering unemployment rate. It however creates more unemployment in Nigeria in the long run.

The result of Variance Decomposition shows that changes in domestic petroleum prices are a significant source of variation in unemployment rate in Nigeria. It can be seen that the changes in domestic oil prices accounts from, 7% to more than 31% of variations of unemployment rate under the review period.

The result of Granger causality test suggests that there is no Granger causality between changes in domestic petroleum prices and unemployment rate in Nigeria.

The significance of these results is that although subsidy withdrawal policy has reduced the incidence of unemployment in the country in the short run, yet it worsens it in the long run.

Going by the above results, it is concluded that there is strong relationship between subsidy withdrawal at the downstream oil sector and increase of unemployment rate in Nigeria. It is further concluded that a deregulation policy has in the long run a positive effect on unemployment in Nigeria. This therefore shows that the above research objective was attained.

6. RO6: *To suggest possible policy measures and actions as short, medium and long-term solutions to the lingering macroeconomic crisis caused by the subsidy withdrawal at the downstream oil-sector in the economy.*

To achieve this objective it was suggested as follows:

That Nigeria as an oil producing country should use its oil resources in a way that will boost other sectors of the economy and bring the desired growth. This can be achieved in the short and medium term by employing the Bacon and Kojima (2006) framework¹³ of given implicit subsidy on petroleum products. This is against paying explicit subsidy which is very expensive and gives room for fraud. According to them, subsidies are said to be explicit when a sum of money is paid to the

¹³ Bacon and Kojima framework was discussed in detail in the chapter three of this thesis.

importers, transporters, wholesalers and retailers by the government. On the other hand the subsidies are implicit where possible government revenues are foregone through lower or zero taxes and by selling government owned crude oil to domestic market and or domestic refineries below international market price.

It is the opinion of the researcher that introducing implicit subsidy will make petroleum products cheaper in the country and benefits both the low income segment of the society and other productive sectors in the economy. This suggestion is made considering the fact that it was discovered in this thesis that manufacturing, agricultural, transport and indeed all other productive sectors in the country depends on oil to operate¹⁴. Therefore, in order to reduce the cost of production there is a need to reduce the cost of petroleum products which is a major input in most of the productive sectors in Nigeria. Another reason is that there is inadequate power supply in Nigeria (Bazilian and Onyeji 2012). Therefore, producers depend on petrol and diesel to fuel their generators in order to operate their machines. A subsidised downstream oil sector will ease the problem of fuelling generators. It will also boost productivity, and lead to the creation of more jobs and reduces the incidence of unemployment. It is pertinent to point out at this juncture that notwithstanding the problems associated with subsidizing downstream oil sector as discussed in chapter two of this thesis it is the

¹⁴ For details see chapter five of this thesis.

view of the researcher that the Nigerian Customs Service and other security agencies can curb the menace of petroleum products smuggling if the government put emphasis on it. Furthermore other leakages associated with it can be adequately controlled by the relevant government agencies if the government is serious about promoting the economic growth of the country.

Another point is that when the cost of input is low, prices of the goods and services produced will also be low which will translate into lower inflation rate. This will attract high demand for those commodities according to the law of demand. This high demand will lead to higher profits which will also lead to an increased supply of goods and services, expansion in the industrial capacity utilisation and increased productivity. This will translate into high GDP growth rate.

An additional advantage of the implicit subsidy is that it is not very expensive like the explicit subsidy and it does not provide much room for fraud as it does not involve direct money payment to refined oil importers, middle men and transporters.

Based on the results of this study one could suggest that in the short term the government should revive the existing refineries and modernise them. While in the medium term the Nigerian government should build many small and medium scale petroleum refineries to complement the old ones and to cater for the rising demand of petroleum products in the domestic market. This will create more jobs, eliminate the

need to import refined products from abroad and will enable the country to conserve foreign currency.

In our analyses chapter it was discovered that there is positive relationship between increase in domestic oil price due to subsidy withdrawal and unemployment. In order to address that problem it is further suggested that in the long term Nigeria should build large modern refineries. This will change the country from refined oil importer to refined oil exporter. It will also bring additional revenue to the country and lead to a favourable balance of payments and translate into economic growth. It is ironical to see non-oil producing countries having large modern oil refineries while a country like Nigeria with vast oil and gas deposits is managing only four old refineries. It is even more curious to see non-oil producing countries exporting refined petroleum while Nigeria as an OPEC member and 12th largest producer of crude oil in the world (EIA. 2012) is importing refined petroleum products for its domestic needs. Under this scenario Nigeria is exporting employment and importing unemployment, because whenever Nigeria exports crude oil it makes it possible for those importing countries to operate refineries and provide employment in their economies. In the same manner when Nigeria imports refined petroleum it is importing unemployment because that foregone refining activity could have provided lots of jobs in the country.

The government should also encourage private investors to build refineries and petrochemical industries. This will positively affect other

sectors of the economy especially the agricultural sector in terms of the provision of fertiliser, pesticides and other related products which are by-products of petroleum. It will also make the country save large sum of foreign currency that are spent every year in the importation of fertilizer and other pesticides. According to El-Rufa'i (2011) the Nigerian government spent a whopping N4.7 billion (equivalent to \$29.4 million) in the importation of fertiliser in 2011.

It is further suggested that the government should strengthen the regulatory and anti-corruption institutions in the country in order to eliminate fraud and encourage fair trade and healthy competition in the sector. This will translate into a reduced cost of operation to the private investors and create jobs for the citizens.

The researcher is of the opinion that pipeline vandalism has direct relationship with youth unemployment. Therefore, when the youth are gainfully employed the problem of pipeline vandalism will reduce if not will be completely eliminated.

Based on the results of this work it was found that the activities of smugglers of petroleum products contributes in the products shortages and triggers inflation in the economy. This erodes the purchasing power of fixed income earners and negatively affects minimum wage. It is therefore suggested that the government should strengthen the Nigerian Custom Service and other security personnel that are responsible for protecting the borders of Nigeria in order to effectively put the smuggling of petroleum under control. Otherwise the implicit

subsidisation and all its attended advantages that have been suggested above will not bring the desired results.

6.4 CONTRIBUTION OF THIS RESEARCH TO THE FRONTIER OF KNOWLEDGE

This research makes contribution to the existing literature by focusing on the effect of increase in petroleum prices as a result of subsidy withdrawal due to the deregulation of the downstream oil sector on the economic growth of Nigeria. The existing literature has made several attempts at studying the effect of oil price shock on the economic growth of many countries. Even on the Nigerian economy there is a large body of literature on the relationship between oil price shocks and economic growth. However, while those studies focus their attentions on the effect of changes in crude oil price in the international market on the economic growth of Nigeria, this study is on the effect of domestic oil price increase on the economic growth of the country. This is significant because Nigeria is an oil producing developing country. Therefore, an increase in oil prices in the international market affects its economy differently from the way domestic increase in petroleum prices affects the economy. While an increase in the crude oil prices in the international market brings higher income to the country, domestic increase in petroleum prices squeezes money out of the people. That money could have been used as an investment in the productive sector which could generate profits, employment and further investments.

Another area through which this study contributes to knowledge is that; this study uses quarterly time series data from 1980q1 to 2012q4 on five major macroeconomic variables in Nigeria namely; Petroleum Price, GDP, Inflation rate, Unemployment rate and Minimum wage and come up with empirical analyses of how changes in domestic oil prices affects these variables. To the best of my knowledge no previous study has done these analyses specifically with the case of Nigerian economy.

Another contribution is in the application of econometric approach analysing the data by using three different techniques. This provides richer understanding and robustness of the results. In this study an unrestricted vector autoregressive model (VAR) was used employing Impulse Response Function, Variance Decomposition and Granger Causality tests to find how the macro economic variables under consideration responds to changes in domestic prices of petroleum in Nigeria. The result shows significant relationship between variation in domestic price of petroleum on three of the four variables, which are GDP, Inflation and Unemployment. While no significant relationship was found between changes in domestic prices of petroleum and Minimum Wage. The result also shows short run positive response of inflation, unemployment and minimum wage to changes in domestic price of petroleum which becomes negative in the long run. It also shows positive response of GDP to changes in domestic petroleum prices both in the short run and long run periods.

The study also contributes to knowledge by providing evidence that subsidy withdrawal at the downstream oil sector brings inflation in the economy, increases the incidence of unemployment and does not have much effect on the minimum wage. It also provides evidence that the positive response of GDP to changes in domestic petroleum price, as indicated by the result of Impulse Response Function is as a result of increased government spending from higher revenue available to it, but not as a result of increased productivity in the economy. Previous studies on the effect of oil price shock on Nigeria's economy have postulated positive effect of oil price shock on GDP growth in Nigeria. However, the result of Granger causality test carried out in this research negated this view. This could serve as a base for future studies.

6.5 LIMITATIONS OF THE STUDY AND SUGGESTIONS FOR FUTURE RESEARCH

The issue of subsidy withdrawal at the downstream oil sector in Nigeria is an ongoing issue and will continue to attract the attention of researchers and government planners. This makes the area attractive for future research.

The data used, the methodology, results and conclusions of this study should serve as a basis for future research on the effect of subsidy withdrawal at the downstream oil sector on the economic growth of Nigeria. However one of the limitations of this research is that, the results obtained and conclusions made may not be applied in other countries

because the data used is on Nigerian macroeconomic variables. Using different set of data from a different country may give different results. However the findings may aid in understanding the relationship between subsidy withdrawal at the downstream oil sector and economic growth of other countries. Understanding the relationship with regards to other oil producing countries is also an area open for future research.

Possible extension can be made to this study by adding more variables to the estimations. It may be rewarding to investigate the effect of subsidy withdrawal at the downstream oil sector on critical welfare variables such as poverty rate, transport, housing, health and education.

Another area for future research would be to study the effect of deregulation of downstream oil sector on the entire economy using Computational General Equilibrium Model (CGE). Employing a CGE model makes it possible for all social, welfare and economic variables in the country to be studied and analysed.

As mentioned at the beginning of this section and in chapter three of this thesis deregulation of the downstream oil sector in Nigeria is an on-going process and is still a partial deregulation. This is because the refineries, the depots and the pipelines are still wholly owned by government. What is actually deregulated is the price aspect through gradual subsidy withdrawal. A further study on this area can be conducted when the whole sector is completely deregulated.

Furthermore, as this research uses quantitative approach, other areas for future research on this topic are the use of qualitative approach where the perception of major players in the downstream oil industry and other Nigerians that are affected by the policy could be sought, studied and analysed.

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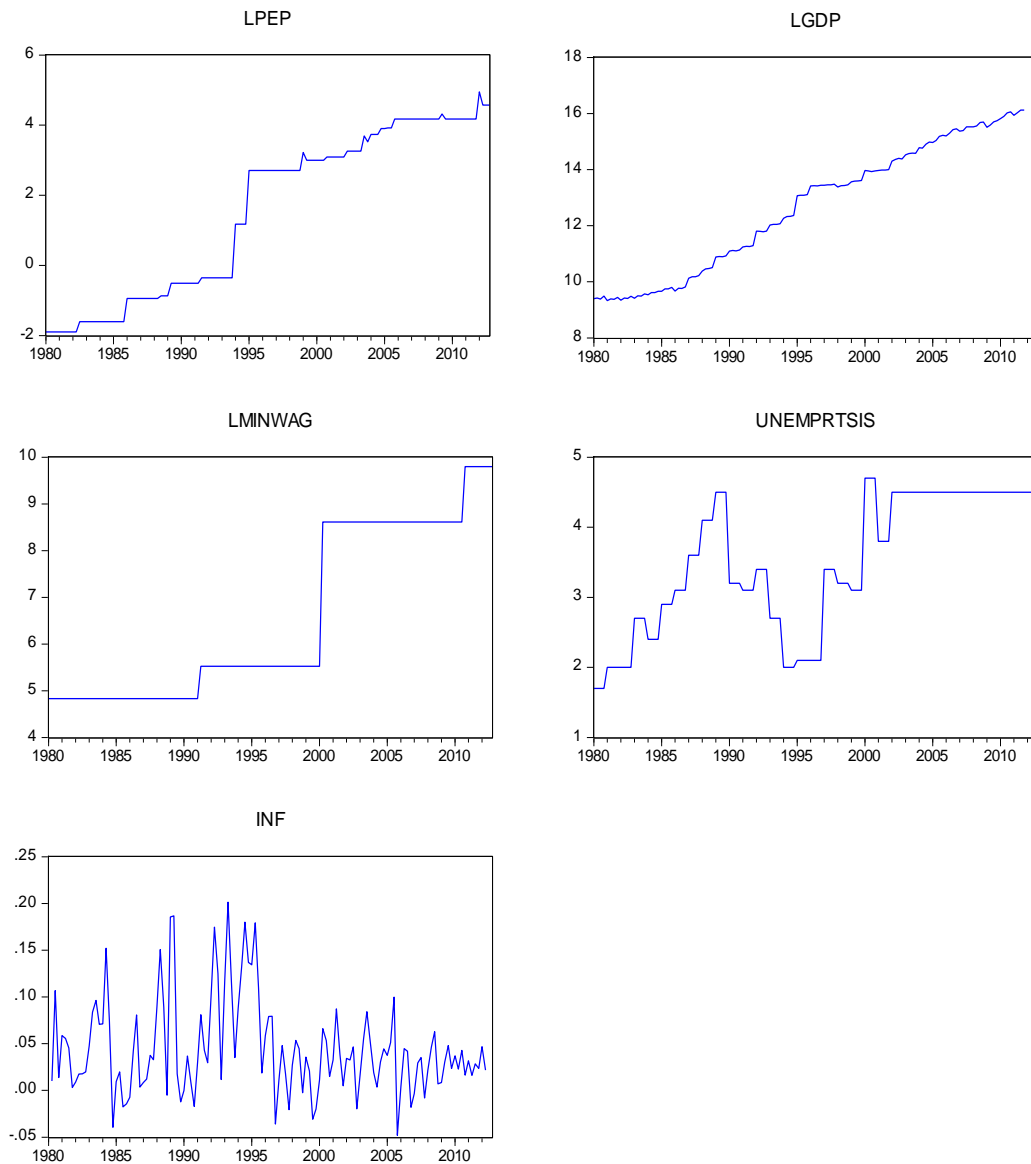
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APPENDIXES

7.1 APPENDIX 1: GRAPHICAL PRESENTATION OF UNIT

ROOTS TEST



7.2 APPENDIX 2: RESULTS OF AUGMENTED DICKEY

FULLER UNIT ROOT TEST

Null Hypothesis: LPEP has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=12)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.908235	0.6446
Test critical values:		
1% level	-4.029595	
5% level	-3.444487	
10% level	-3.147063	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LPEP)

Method: Least Squares

Date: 01/17/13 Time: 21:35

Sample (adjusted): 1980Q2 2012Q4

Included observations: 131 after adjustments

Variable	Coefficient	t	Std. Error	t-Statistic	Prob.
LPEP(-1)	-0.059765	0.031320	-1.908235	0.0586	
C	-0.090448	0.086848	-1.041451	0.2996	
@TREND(1980Q1)	0.003467	0.001950	1.777834	0.0778	
R-squared	0.028078	Mean dependent var		0.049403	
Adjusted R-squared	0.012892	S.D. dependent var		0.224256	
S.E. of regression	0.222805	Akaike info criterion		0.142401	
Sum squared resid	6.354212	Schwarz criterion		0.076557	
Log likelihood	12.32726	Hannan-Quinn criter.		0.115645	
F-statistic	1.848920	Durbin-Watson stat		2.18949	

Prob(F-statistic) 0.161586

Null Hypothesis: D(LPEP) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=12)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-12.85338	0.0000
Test critical values:		
1% level	-4.030157	
5% level	-3.444756	
10% level	-3.147221	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LPEP,2)

Method: Least Squares

Date: 01/17/13 Time: 21:42

Sample (adjusted): 1980Q3 2012Q4

Included observations: 130 after adjustments

Variable	Coefficient	t	Std. Error	t-Statistic	Prob.
D(LPEP(-1))	-1.130636	0.087964	-12.85338	0.0000	
C	0.066721	0.040436	1.650047	0.1014	
@TREND(1980Q1)	-0.000157	0.000526	-0.298548	0.7658	
R-squared	0.565387	Mean dependent var			-5.95E-18
Adjusted R-squared	0.558542	S.D. dependent var			0.33839
S.E. of regression	0.224837	Akaike info criterion			0.12407
Sum squared resid	6.420091	Schwarz criterion			0.05789
Log likelihood	11.06463	Hannan-Quinn criter.			0.09718
F-statistic	82.60691	Durbin-Watson stat			2.01403
Prob(F-statistic)	0.000000				3

Null Hypothesis: LGDP has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 4 (Automatic - based on SIC, maxlag=12)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.029407	0.5792
Test critical values:		
1% level	-4.034356	
5% level	-3.446765	
10% level	-3.148399	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(LGDP)
 Method: Least Squares
 Date: 01/17/13 Time: 21:54
 Sample (adjusted): 1981Q2 2011Q4
 Included observations: 123 after adjustments

Variable	Coefficient	t	Std. Error	t-Statistic	Prob.
LGDP(-1)	-0.068107	0.033560	-2.029407	0.0447	
D(LGDP(-1))	-0.078780	0.083723	-0.940967	0.3487	
D(LGDP(-2))	-0.104766	0.083748	-1.250972	0.2135	
D(LGDP(-3))	-0.022924	0.082732	-0.277092	0.7822	
D(LGDP(-4))	0.424213	0.082502	5.141841	0.0000	
C	0.634967	0.287399	2.209360	0.0291	
@TREND(1980Q1)	0.004169	0.002102	1.983250	0.0497	
			Mean dependent	0.055248	
R-squared	0.256537	var			
Adjusted R-squared				0.112663	
	0.218082	S.D. dependent var		-	
				1.719613	
S.E. of regression	0.099623	Akaike info criterion		-	
				1.559570	
Sum squared resid	1.151278	Schwarz criterion		-	
				1.654604	
Log likelihood	112.7562	Hannan-Quinn criter.		4	

F-statistic	6.671087	Durbin-Watson stat	1.99176
Prob(F-statistic)	0.000004		5

Null Hypothesis: D(LGDP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic - based on SIC, maxlag=12)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.318021	0.0041
Test critical values:		
1% level	-4.034356	
5% level	-3.446765	
10% level	-3.148399	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGDP,2)
Method: Least Squares
Date: 01/17/13 Time: 21:47
Sample (adjusted): 1981Q2 2011Q4
Included observations: 123 after adjustments

Variable	Coefficient	t	Std. Error	t-Statistic	Prob.
D(LGDP(-1))	-0.886089	0.205207	-4.318021	0.0000	
D(LGDP(-1),2)	-0.230528	0.168813	-1.365579	0.1747	
D(LGDP(-2),2)	-0.367705	0.127179	-2.891235	0.0046	
D(LGDP(-3),2)	-0.412149	0.083377	-4.943188	0.0000	
C	0.053322	0.021580	2.470882	0.0149	
@TREND(1980Q1)	-6.58E-05	0.000257	-0.256090	0.7983	
R-squared	0.660720	Mean dependent var		0.001359	
Adjusted R-squared	0.646221	S.D. dependent var		0.169710	
S.E. of regression	0.100942	Akaike info criterion		1.700985	
Sum squared resid	1.192154	Schwarz criterion		1.563805	
Log likelihood	110.6106	Hannan-Quinn criter.		1.64526	

			3
			1.98271
F-statistic	45.56952	Durbin-Watson stat	3
Prob(F-statistic)	0.000000		

Null Hypothesis: LMINWAG has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=12)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.443058	0.3559
Test critical values:		
1% level	-4.029595	
5% level	-3.444487	
10% level	-3.147063	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(LMINWAG)
 Method: Least Squares
 Date: 01/17/13 Time: 22:04
 Sample (adjusted): 1980Q2 2012Q4
 Included observations: 131 after adjustments

Variable	Coefficient	t	Std. Error	t-Statistic	Prob.
LMINWAG(-1)	-0.080508	0.032954	-2.443058	0.0159	
C	0.296952	0.130641	2.273036	0.0247	
@TREND(1980Q1)	0.004048	0.001587	2.550401	0.0119	
			Mean dependent	0.03793	
R-squared	0.049029	var		8	
Adjusted R-squared				0.29420	
	0.034170	S.D. dependent var		2	
S.E. of regression	0.289132	Akaike info criterion		0.37876	
				9	
Sum squared resid	10.70047	Schwarz criterion		0.44461	
		Hannan-Quinn		3	
Log likelihood	-21.80937	criter.		0.40552	
				4	
F-statistic	3.299662	Durbin-Watson stat		1.97302	
Prob(F-statistic)	0.040058			5	

Null Hypothesis: D(LMINWAG) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=12)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-11.51495	0.0000
Test critical values:		
1% level	-4.030157	
5% level	-3.444756	
10% level	-3.147221	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(LMINWAG,2)
 Method: Least Squares
 Date: 01/17/13 Time: 22:05
 Sample (adjusted): 1980Q3 2012Q4
 Included observations: 130 after adjustments

Variable	Coefficient	t	Std. Error	t-Statistic	Prob.
D(LMINWAG(-1))	-1.021790	0.088736	-11.51495	0.0000	
C	0.003056	0.052983	0.057675	0.9541	
@TREND(1980Q1)	0.000541	0.000696	0.778363	0.4378	
			Mean dependent		0.00000
R-squared	0.510777	var			0
Adjusted R-squared					0.42115
	0.503073				
S.E. of regression	0.296888	S.D. dependent var			9
					0.43188
S.E. of regression	0.296888	Akaike info criterion			3
					0.49805
Sum squared resid	11.19410	Schwarz criterion			7
		Hannan-Quinn			0.45877
Log likelihood	-25.07240	criter.			2
					2.00049
F-statistic	66.29777	Durbin-Watson stat			3
Prob(F-statistic)	0.000000				

Null Hypothesis: UNEMPRTSIS has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=12)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.530826	0.3130
Test critical values:		
1% level	-4.029595	
5% level	-3.444487	
10% level	-3.147063	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(UNEMPRTSIS)
 Method: Least Squares
 Date: 01/17/13 Time: 22:07
 Sample (adjusted): 1980Q2 2012Q4
 Included observations: 131 after adjustments

Variable	Coefficient	t	Std. Error	t-Statistic	Prob.
UNEMPRTSIS(-1)	-0.093157	0.036809	-2.530826	0.0126	
C	0.245757	0.094395	2.603508	0.0103	
@TREND(1980Q1)	0.001521	0.000948	1.603927	0.1112	
			Mean dependent	0.02137	
R-squared	0.049038	var		4	
Adjusted R-squared				0.27651	
	0.034179	S.D. dependent var		9	
S.E. of regression	0.271752	Akaike info criterion		0.25478	
				3	
Sum squared resid	9.452708	Schwarz criterion		0.32062	
		Hannan-Quinn		7	
Log likelihood	-13.68825	criter.		0.28153	
				8	
				1.92782	
F-statistic	3.300268	Durbin-Watson stat		3	
Prob(F-statistic)	0.040035				

Null Hypothesis: D(UNEMPRTSIS) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=12)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-11.35589	0.0000
Test critical values:		
1% level	-4.030157	
5% level	-3.444756	
10% level	-3.147221	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(UNEMPRTSIS,2)
 Method: Least Squares
 Date: 01/17/13 Time: 22:08
 Sample (adjusted): 1980Q3 2012Q4
 Included observations: 130 after adjustments

Variable	Coefficient	t	Std. Error	t-Statistic	Prob.
D(UNEMPRTSIS(-1))	-1.007563	0.088726	-11.35589	0.0000	
C	0.041238	0.050011	0.824572	0.4112	
@TREND(1980Q1)	-0.000294	0.000654	-0.449359	0.6539	
R-squared	0.503823	Mean dependent var	-5.73E-18		
Adjusted R-squared	0.496009	S.D. dependent var	0.393750		
S.E. of regression	0.279532	Akaike info criterion	0.311407		
Sum squared resid	9.923548	Schwarz criterion	0.377581		
Log likelihood	-17.24146	Hannan-Quinn criter.	0.338290		
F-statistic	64.47841	Durbin-Watson stat	2.000286		
Prob(F-statistic)	0.000000				

Null Hypothesis: INF has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 2 (Automatic - based on SIC, maxlag=12)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.808212	0.0192
Test critical values:		
1% level	-4.032498	
5% level	-3.445877	
10% level	-3.147878	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(INF)
 Method: Least Squares
 Date: 01/17/13 Time: 22:09
 Sample (adjusted): 1981Q1 2012Q2
 Included observations: 126 after adjustments

Variable	Coefficient	t	Std. Error	t-Statistic	Prob.
INF(-1)	-0.367822	0.096586	-3.808212	0.0002	
D(INF(-1))	0.018408	0.087682	0.209943	0.8341	
D(INF(-2))	-0.406596	0.080407	-5.056749	0.0000	
C	0.024292	0.009412	2.580802	0.0111	
@TREND(1980Q1)	-0.000116	9.97E-05	-1.165553	0.2461	

		Mean dependent	
R-squared	0.415507	var	6.32E-05
Adjusted R-squared			0.05094
	0.396185	S.D. dependent var	9
			-
			3.58160
S.E. of regression	0.039590	Akaike info criterion	2
			-
			3.46905
Sum squared resid	0.189652	Schwarz criterion	1
			-
		Hannan-Quinn	3.53587
Log likelihood	230.6409	criter.	6
			2.05623
F-statistic	21.50429	Durbin-Watson stat	8

Prob(F-statistic) 0.000000

Null Hypothesis: D(INF) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 2 (Automatic - based on SIC, maxlag=12)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-11.73543	0.0000
Test critical values:		
1% level	-4.033108	
5% level	-3.446168	
10% level	-3.148049	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(INF,2)
 Method: Least Squares
 Date: 01/17/13 Time: 22:11
 Sample (adjusted): 1981Q2 2012Q2
 Included observations: 125 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF(-1))	-2.175204	0.185354	-11.73543	0.0000
D(INF(-1),2)	0.870575	0.123822	7.030849	0.0000
D(INF(-2),2)	0.234490	0.085139	2.754202	0.0068
C	-0.000480	0.007570	-0.063454	0.9495
@TREND(1980Q1)	-1.86E-06	9.95E-05	-0.018711	0.9851

		Mean dependent	0.00056
R-squared	0.728371	var	2
Adjusted R-squared	0.719316	S.D. dependent var	8
			3.55496
S.E. of regression	0.040115	Akaike info criterion	3
			3.44183
Sum squared resid	0.193104	Schwarz criterion	1
			-
		Hannan-Quinn	3.50900
Log likelihood	227.1852	criter.	3

F-statistic	80.44457	Durbin-Watson stat	1.91100
Prob(F-statistic)	0.000000		1

7.3 APPENDIX 3: RESULTS OF PHILIPS PERRON UNIT

ROOT TEST

Null Hypothesis: LPEP has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-2.056214	0.5648
Test critical values:		
1% level	-4.029595	
5% level	-3.444487	
10% level	-3.147063	

*MacKinnon (1996) one-sided p-values.

	0.04850
Residual variance (no correction)	5
	0.05544
HAC corrected variance (Bartlett kernel)	7

Phillips-Perron Test Equation

Dependent Variable: D(LPEP)

Method: Least Squares

Date: 01/17/13 Time: 22:26

Sample (adjusted): 1980Q2 2012Q4

Included observations: 131 after adjustments

Variable	Coefficient	t	Std. Error	t-Statistic	Prob.
LPEP(-1)	-0.059765	0.031320	-1.908235	0.0586	
C	-0.090448	0.086848	-1.041451	0.2996	
@TREND(1980Q1)	0.003467	0.001950	1.777834	0.0778	
R-squared	0.028078	Mean dependent var	0.049403		
Adjusted R-squared	0.012892	S.D. dependent var	0.224256		
S.E. of regression	0.222805	Akaike info criterion	0.142401		
Sum squared resid	6.354212	Schwarz criterion	0.07655		

			7
			-
		Hannan-Quinn	0.11564
Log likelihood	12.32726	criter.	5
			2.18949
F-statistic	1.848920	Durbin-Watson stat	1
Prob(F-statistic)	0.161586		

Null Hypothesis: D(LPEP) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 7 (Newey-West automatic) using Bartlett

	Adj. t-Stat
Phillips-Perron test statistic	-12.77299
Test critical values:	
1% level	-4.030157
5% level	-3.444756
10% level	-3.147221

*Mackinnon (1996) one-sided p-values.

Residual variance (no correction)
HAC corrected variance (Bartlett kernel)

Phillips-Perron Test Equation
Dependent Variable: D(LPEP,2)
Method: Least Squares
Date: 01/17/13 Time: 22:38
Sample (adjusted): 1980Q3 2012Q4
Included observations: 130 after adjustments

Variable	Coefficient	t	Std. Error	t-Statistic
D(LPEP(-1))	-1.130636	0.087964	-12.85338	
C	0.066721	0.040436	1.650047	
@TREND(1980Q1)	-0.000157	0.000526	-0.298548	

R-squared	0.565387	Mean dependent var
Adjusted R-squared	0.558542	S.D. dependent var
S.E. of regression	0.224837	Akaike info criterion
Sum squared resid	6.420091	Schwarz criterion
		Hannan-Quinn
Log likelihood	11.06463	criter.
F-statistic	82.60691	Durbin-Watson stat
Prob(F-statistic)	0.000000	

Null Hypothesis: LGDP has a unit root
 Exogenous: Constant, Linear Trend
 Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-2.510316	0.3228
Test critical values:		
1% level	-4.031899	
5% level	-3.445590	
10% level	-3.147710	

*Mackinnon (1996) one-sided p-values.

	0.01204
Residual variance (no correction)	2
	0.01205
HAC corrected variance (Bartlett kernel)	8

Phillips-Perron Test Equation
 Dependent Variable: D(LGDP)
 Method: Least Squares
 Date: 01/17/13 Time: 22:33
 Sample (adjusted): 1980Q2 2011Q4
 Included observations: 127 after adjustments

Variable	Coefficient	t	Std. Error	t-Statistic	Prob.
LGDP(-1)	-0.083839	0.033413	-2.509188	0.0134	
C	0.776493	0.291209	2.666444	0.0087	
@TREND(1980Q1)	0.005228	0.002067	2.528972	0.0127	
R-squared	0.049050	Mean dependent var			0.052926
Adjusted R-squared	0.033712	S.D. dependent var			0.112977
S.E. of regression	0.111057	Akaike info criterion			1.534213
Sum squared resid	1.529366	Schwarz criterion			1.467027
Log likelihood	100.4225	Hannan-Quinn criter.			1.506916
F-statistic	3.197934	Durbin-Watson stat			2.170900

Prob(F-statistic) 0.044237

Null Hypothesis: D(LGDP) has a unit root

Null Hypothesis: LMINWAG has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-2.454943	0.3499
Test critical values:		
1% level	-4.029595	
5% level	-3.444487	
10% level	-3.147063	

*MacKinnon (1996) one-sided p-values.

	0.08168
Residual variance (no correction)	3
	0.08275
HAC corrected variance (Bartlett kernel)	0

Phillips-Perron Test Equation

Dependent Variable: D(LMINWAG)

Method: Least Squares

Date: 01/17/13 Time: 22:45

Sample (adjusted): 1980Q2 2012Q4

Included observations: 131 after adjustments

Variable	Coefficient	t	Std. Error	t-Statistic	Prob.
LMINWAG(-1)	-0.080508	0.032954	-2.443058	0.0159	
C	0.296952	0.130641	2.273036	0.0247	
@TREND(1980Q1)	0.004048	0.001587	2.550401	0.0119	
Mean dependent					0.03793
R-squared	0.049029	var			8
Adjusted R-squared	0.034170	S.D. dependent var			2
S.E. of regression	0.289132	Akaike info criterion			0.37876

			9
			0.44461
Sum squared resid	10.70047	Schwarz criterion	3
		Hannan-Quinn	0.40552
Log likelihood	-21.80937	criter.	4
			1.97302
F-statistic	3.299662	Durbin-Watson stat	5
Prob(F-statistic)	0.040058		

Null Hypothesis: D(LMINWAG) has a unit root
 Exogenous: Constant, Linear Trend
 Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-11.51885	0.0000
Test critical values:		
1% level	-4.030157	
5% level	-3.444756	
10% level	-3.147221	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.08610
	8
HAC corrected variance (Bartlett kernel)	0.08306
	2

Phillips-Perron Test Equation
 Dependent Variable: D(LMINWAG,2)
 Method: Least Squares
 Date: 01/17/13 Time: 22:46
 Sample (adjusted): 1980Q3 2012Q4
 Included observations: 130 after adjustments

Variable	Coefficient	t	Std. Error	t-Statistic	Prob.
D(LMINWAG(-1))	-1.021790	0.088736	-11.51495	0.0000	
C	0.003056	0.052983	0.057675	0.9541	
@TREND(1980Q1)	0.000541	0.000696	0.778363	0.4378	
R-squared	0.510777	Mean dependent var		0.00000	
Adjusted R-squared					0
					0.42115
S.E. of regression	0.503073	S.D. dependent var			9
					0.43188
Sum squared resid	0.296888	Akaike info criterion			3
					0.49805
Log likelihood	11.19410	Schwarz criterion			7
		Hannan-Quinn			0.45877
	-25.07240	criter.			2

F-statistic	66.29777	Durbin-Watson stat	2.00049
Prob(F-statistic)	0.000000		3

Null Hypothesis: UNEMPRTSIS has a unit root
 Exogenous: Constant, Linear Trend
 Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-2.499804	0.3279
Test critical values:		
1% level	-4.029595	
5% level	-3.444487	
10% level	-3.147063	

*MacKinnon (1996) one-sided p-values.

	0.07215
Residual variance (no correction)	8
	0.07016
HAC corrected variance (Bartlett kernel)	8

Phillips-Perron Test Equation
 Dependent Variable: D(UNEMPRTSIS)
 Method: Least Squares
 Date: 01/17/13 Time: 22:47
 Sample (adjusted): 1980Q2 2012Q4
 Included observations: 131 after adjustments

Variable	Coefficient	t	Std. Error	t-Statistic	Prob.
UNEMPRTSIS(-1)	-0.093157	0.036809	-2.530826	0.0126	
C	0.245757	0.094395	2.603508	0.0103	
@TREND(1980Q1)	0.001521	0.000948	1.603927	0.1112	
			Mean dependent		0.02137
R-squared	0.049038	var			4
Adjusted R-squared					0.27651
	0.034179	S.D. dependent var			9
					0.25478
S.E. of regression	0.271752	Akaike info criterion			3
					0.32062
Sum squared resid	9.452708	Schwarz criterion			7
		Hannan-Quinn			0.28153
Log likelihood	-13.68825	criter.			8
F-statistic	3.300268	Durbin-Watson stat			1.92782

Prob(F-statistic) 0.040035

Null Hypothesis: D(UNEMPRTSIS) has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 15 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-11.51717	0.0000
Test critical values:		
1% level	-4.030157	
5% level	-3.444756	
10% level	-3.147221	

*MacKinnon (1996) one-sided p-values.

	0.07633
Residual variance (no correction)	5
	0.05408
HAC corrected variance (Bartlett kernel)	2

Phillips-Perron Test Equation

Dependent Variable: D(UNEMPRTSIS,2)

Method: Least Squares

Date: 01/17/13 Time: 22:49

Sample (adjusted): 1980Q3 2012Q4

Included observations: 130 after adjustments

Variable	Coefficient	t	Std. Error	t-Statistic	Prob.
D(UNEMPRTSIS(-1))	-1.007563	0.088726	-11.35589	0.0000	
C	0.041238	0.050011	0.824572	0.4112	
@TREND(1980Q1)	-0.000294	0.000654	-0.449359	0.6539	
R-squared	0.503823	Mean dependent var	-5.73E-18		
Adjusted R-squared	0.496009	S.D. dependent var	0.39375		
S.E. of regression	0.279532	Akaike info criterion	0.31140		
Sum squared resid	9.923548	Schwarz criterion	0.37758		
Log likelihood	-17.24146	Hannan-Quinn	0.33829		

		criter.	6
			2.00028
F-statistic	64.47841	Durbin-Watson stat	2
Prob(F-statistic)	0.000000		

Null Hypothesis: INF has a unit root
 Exogenous: Constant, Linear Trend
 Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-7.117617	0.0000
Test critical values:		
1% level	-4.031309	
5% level	-3.445308	
10% level	-3.147545	

*MacKinnon (1996) one-sided p-values.

	0.00194
Residual variance (no correction)	7
	0.00229
HAC corrected variance (Bartlett kernel)	3

Phillips-Perron Test Equation
 Dependent Variable: D(INF)
 Method: Least Squares
 Date: 01/17/13 Time: 22:55
 Sample (adjusted): 1980Q3 2012Q2
 Included observations: 128 after adjustments

Variable	Coefficient	t	Std. Error	t-Statistic	Prob.
INF(-1)	-0.540322	0.079037	-6.836316	0.0000	
C	0.034051	0.009339	3.646079	0.0004	
@TREND(1980Q1)	-0.000148	0.000108	-1.363601	0.1751	

	Mean dependent		
R-squared	0.272305	var	9.06E-05
Adjusted R-squared			0.05193
	0.260661	S.D. dependent var	3
			-
			3.35658
S.E. of regression	0.044654	Akaike info criterion	0
			-
			3.28973
Sum squared resid	0.249249	Schwarz criterion	5
		Hannan-Quinn	-
Log likelihood	217.8211	criter.	3.32942

			0
			1.79431
F-statistic	23.38758	Durbin-Watson stat	0
Prob(F-statistic)	0.000000		

Null Hypothesis: D(INF) has a unit root
 Exogenous: Constant, Linear Trend
 Bandwidth: 9 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-16.98438	0.0000
Test critical values:		
1% level	-4.031899	
5% level	-3.445590	
10% level	-3.147710	

*MacKinnon (1996) one-sided p-values.

	0.00257
Residual variance (no correction)	5
	0.00070
HAC corrected variance (Bartlett kernel)	8

Phillips-Perron Test Equation
 Dependent Variable: D(INF,2)
 Method: Least Squares
 Date: 01/17/13 Time: 22:58
 Sample (adjusted): 1980Q4 2012Q2
 Included observations: 127 after adjustments

Variable	Coefficient	t	Std. Error	t-Statistic	Prob.
D(INF(-1))	-1.133050	0.087832	-12.90023	0.0000	
C	-0.001474	0.009385	-0.157080	0.8754	
@TREND(1980Q1)	1.28E-05	0.000124	0.102626	0.9184	
					-
		Mean dependent		0.00096	
R-squared	0.573094	var		1	
Adjusted R-squared				0.07797	
	0.566209	S.D. dependent var		0	
					-
				3.07683	
S.E. of regression	0.051353	Akaike info criterion		9	
					-
				3.00965	
Sum squared resid	0.327007	Schwarz criterion		4	

			-
		Hannan-Quinn	3.04954
Log likelihood	198.3793	criter.	2
			2.08771
F-statistic	83.23114	Durbin-Watson stat	8
Prob(F-statistic)	0.000000		

7.4 APPENDIX 4: RESULT OF JOHANSEN COINTEGRATION

TEST

Date: 01/20/13 Time: 19:10
Sample (adjusted): 1981Q3 2011Q4
Included observations: 122 after adjustments
Trend assumption: Linear deterministic trend
Series: LPEP LGDP LMINWAG
UNEMPRTSIS
Lags interval (in first differences): 1 to 5

Unrestricted Cointegration Rank Test (Trace)

Hypothesize d				
No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.192747	41.85915	47.85613	0.1627
At most 1	0.070140	15.73677	29.79707	0.7306
At most 2	0.051114	6.864776	15.49471	0.5934
At most 3	0.003795	0.463813	3.841466	0.4958

Trace test indicates no cointegration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesize d				
No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.192747	26.12239	27.58434	0.0760
At most 1	0.070140	8.871989	21.13162	0.8426
At most 2	0.051114	6.400963	14.26460	0.5623
At most 3	0.003795	0.463813	3.841466	0.4958

Max-eigenvalue test indicates no cointegration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by
 $b'S_{11}b=I$):

LPEP	LGDP	LMINWAG	UNEMPRTSIS
-2.316064	2.448435	-0.619328	1.269024
-2.094820	2.243533	0.321427	-1.566147
0.267476	-1.330515	1.383119	-0.084740
0.545763	-0.765987	-0.485541	0.376787

Unrestricted Adjustment Coefficients (alpha):

D(LPEP)	0.032645	0.043533	-0.002741	0.004523
D(LGDP)	0.016781	-0.007802	0.002542	0.003908
D(LMINWAG)	0.021471	-0.012706	-0.056950	-0.000441
D(UNEMPRT SIS)	-0.087978	-0.017031	-0.006668	0.009229

1 Cointegrating Equation(s):	Log likelihood	165.0681
---------------------------------	-------------------	----------

Normalized cointegrating coefficients (standard error in parentheses)

LPEP	LGDP	LMINWAG	UNEMPRTSIS
1.000000	-1.057153 (0.09330)	0.267405 (0.14142)	-0.547923 (0.18077)

Adjustment coefficients (standard error in parentheses)

D(LPEP)	-0.075608 (0.04456)
D(LGDP)	-0.038867 (0.01823)
D(LMINWAG)	-0.049728 (0.06028)
D(UNEMPRT SIS)	0.203762 (0.05667)

2 Cointegrating Equation(s):	Log likelihood	169.5041
---------------------------------	-------------------	----------

Normalized cointegrating coefficients (standard error in parentheses)

LPEP	LGDP	LMINWAG	UNEMPRTSIS
1.000000	0.000000	32.41953 (15.1010)	-99.52695 (30.5572)
0.000000	1.000000	30.41387	-93.62788

(14.2461) (28.8273)

Adjustment coefficients (standard error in parentheses)

D(LPEP)	-0.166802 (0.05853)	0.177597 (0.06224)
D(LGDP)	-0.022523 (0.02447)	0.023584 (0.02602)
D(LMINWAG)	-0.023111 (0.08118)	0.024064 (0.08633)
D(UNEMPRT SIS)	0.239438 (0.07623)	-0.253617 (0.08106)

3 Cointegrating
Equation(s):

Log
likelihood 172.7046

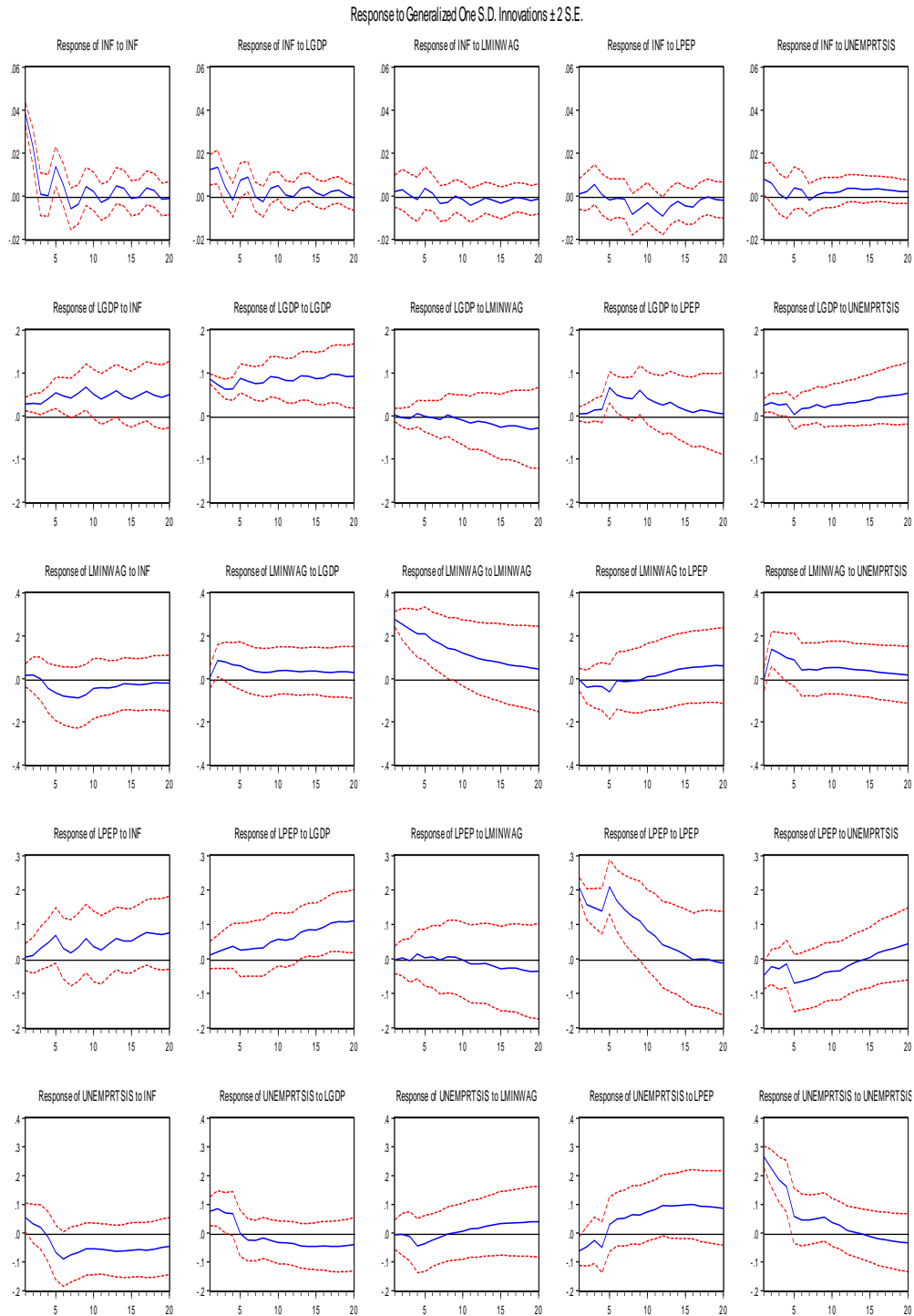
Normalized cointegrating coefficients (standard error in parentheses)

LPEP	LGDP	LMINWAG	UNEMPRTSIS
1.000000	0.000000	0.000000	-3.730545 (0.84350)
0.000000	1.000000	0.000000	-3.757995 (0.86151)
0.000000	0.000000	1.000000	-2.954898 (0.55450)

Adjustment coefficients (standard error in parentheses)

D(LPEP)	-0.167535 (0.05874)	0.181244 (0.06704)	-0.010017 (0.02903)
D(LGDP)	-0.021843 (0.02454)	0.020202 (0.02801)	-0.009385 (0.01213)
D(LMINWAG)	-0.038344 (0.07950)	0.099837 (0.09074)	-0.096150 (0.03929)
D(UNEMPRT SIS)	0.237655 (0.07648)	-0.244744 (0.08729)	0.039790 (0.03780)

7.5 APPENDIX 5: RESULTS OF THE IMPULSE RESPONSE FUNCTION



7.6 APPENDIX 6: RESULT OF PAIR WISE GRANGER

CAUSALITY TEST

Pairwise Granger Causality Tests

Date: 01/20/13 Time: 18:33

Sample: 1980Q1 2012Q4

Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
LGDP does not Granger Cause LPEP	123	1.53747	0.1839
LPEP does not Granger Cause LGDP		7.45143	5.E-06
LMINWAG does not Granger Cause LPEP	127	0.15032	0.9796
LPEP does not Granger Cause LMINWAG		1.72982	0.1332
UNEMPRTSIS does not Granger Cause LPEP	127	1.38229	0.2360
LPEP does not Granger Cause UNEMPRTSIS		1.50747	0.1928
INF does not Granger Cause LPEP	124	2.66529	0.0257
LPEP does not Granger Cause INF		1.23759	0.2963
LMINWAG does not Granger Cause LGDP	123	0.33422	0.8913
LGDP does not Granger Cause LMINWAG		2.41827	0.0402
UNEMPRTSIS does not Granger Cause LGDP	123	3.31160	0.0079
LGDP does not Granger Cause UNEMPRTSIS		0.94859	0.4527
INF does not Granger Cause LGDP	122	1.79618	0.1194
LGDP does not Granger Cause INF		1.63115	0.1576
UNEMPRTSIS does not Granger Cause LMINWAG	127	6.86240	1.E-05
LMINWAG does not Granger Cause UNEMPRTSIS		0.87390	0.5010
INF does not Granger Cause LMINWAG	124	0.73568	0.5982
LMINWAG does not Granger Cause INF		0.60639	0.6951
INF does not Granger Cause UNEMPRTSIS	124	2.44242	0.0384
UNEMPRTSIS does not Granger Cause INF		0.35071	0.8809

7.7 APPENDIX 7: LAG LENGTH CRITARIA

VAR Lag Order Selection Criteria

Endogenous variables: INF LGDP LMINWAG LPEP UNEMPRTSIS

Exogenous variables: C

Date: 03/31/14 Time: 18:19

Sample: 1980Q1 2012Q4

Included observations: 121

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-400.1344	NA	0.000557	6.696436	6.811964	6.743356
1	292.0362	1315.696	9.05e-09	-4.331177	-3.638006*	-4.049654*
2	326.2348	62.17926	7.79e-09	-4.483220	-3.212406	-3.967094
3	352.6031	45.76320	7.66e-09	-4.505837	-2.657380	-3.755108
4	373.5946	34.69672	8.27e-09	-4.439581	-2.013481	-3.454249
5	425.3215	81.22407*	5.40e-09*	-4.881348*	-1.877606	-3.661414
6	445.4494	29.94230	6.00e-09	-4.800817	-1.219432	-3.346280
7	460.8102	21.58127	7.28e-09	-4.641491	-0.482464	-2.952351
8	481.9225	27.91707	8.13e-09	-4.577231	0.159439	-2.653489

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

The content of Appendix 8 (pages 265-293) - *Publications from the thesis* have been removed to comply with copyright law. The citations to the published articles are listed below.

Sani, S.B. and Kouhy, R. 2014. Effect of the deregulation of down stream oil sector on the gross domestic product (GDP) and employment in Nigeria. *The MacrotHEME Review*. 3(3). pp. 117-135

Sani, S.B. 2014. Taxonomy of downstream oil market deregulation and subsidisation: theoretical issues. *The MacrotHEME Review*. 3(6): pp. 38-48